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The Evolution of Tactical Ideas
in
France and Germany

During the War of 1914-1918

By
Lieutenant Colonel Lucas
General Staff List

1923

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FRANCE AND GERMANY

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Translated by Major P. V. Kieffer, F.A.

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Figure 1 is a line graph showing the percentage of total protein in the supernatant versus the percentage of total protein in the pellet for various proteins. The y-axis is labeled 'PERCENTAGE OF TOTAL PROTEIN IN SUPERNATANT' and ranges from 0 to 100. The x-axis is labeled 'PERCENTAGE OF TOTAL PROTEIN IN PELLE' and ranges from 0 to 100. The legend indicates: open circles for 'EXTRACTED FROM SUPERNATANT', open squares for 'EXTRACTED FROM PELLE', and filled circles for 'EXTRACTED FROM BOTH'. Data points are plotted for various proteins: BSA, IgG, PEG, and several others. BSA and IgG show high supernatant extraction, while PEG and others show high pellet extraction.

Figure 1 consists of nine micrographs arranged in a 3x3 grid. Each micrograph shows a cell colony at a different stage of development. The colonies are roughly circular and composed of individual cells. From top-left to bottom-right, the colonies increase in size and the number of cells, illustrating the progression of cell growth and division.

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TABLE OF CONTENTS

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	Pages
INTRODUCTION	5
CHAPTER I	
PRE-WAR DOCTRINE IN FRANCE AND IN GERMANY	
I. -- Our War Doctrine Prior to 1924	1
A. -- Conception of Operations.....	1
B. -- Execution of Operations.....	3
C. -- Opinion in Military Circles Prior to the War.....	4
D. -- What Our Regulations Prescribed With Reference to the Defensive.....	5
E. -- What Our Regulations Prescribed With Reference to the Offensive.....	8
F. -- Was Our Doctrine Responsible for our Reverses at the Beginning of the War?.....	15
G. -- The Doctrine of the War College and the Role of the Staffs.....	20
II. -- The Pre-War Doctrine in Germany.....	22
CHAPTER II	
SUMMER AND AUTUMN, 1914 -- OPEN WARFARE OPERATIONS	
I. -- <u>First Phase</u> (2 August--13 September, 1914).....	28
Strategic Lessons.....	28
Tactical Lessons, Notes of 16 and 24 August, 1914.....	34
Conclusion.....	42
II. -- <u>Second Phase</u> (13 September--16 November, 1914).....	43
CHAPTER III	
WINTER OF 1914-1915 AND THE YEAR 1915	
BEGINNING OF POSITION WARFARE -- PERIOD OF GROPING	
What were the Opinions at This Time?.....	46
The New Form of War: Stabilization and the Problems which it presented....	47
I. -- <u>First Phase.</u> (Winter of 1914-1915)	
1st. The Early Attacks Against a Fortified Front.....	52
2d. First Conception of Offensive Operations. Note of 2 January, 1915.....	53

3d. New Conception of Offensive Operations. Instruction of 16 April, 1915.....	57
4th. Progress Made In Defensive Organization During the Winter of 1914-1915.....	62
II. -- <u>Second Phase</u> (the year 1915)	
1st. The Artois Offensive (9 May--18 June, 1915).....	63
2d. Lessons on the Offensive.....	65
3d. Lessons on the Defensive.....	71
4th. The Champagne--Artois Offensive (25 September, 1915).....	77
5th. Lessons on the Offensive.....	84
6th. Lessons on the Defensive.....	88
7th. Lessons Reduced by the Germans on the Defensive.....	93
III. -- Conclusion.....	95

CHAPTER IV

THE YEAR 1916 -- PERIOD OF DEVELOPMENT

1st. A New Conception of Offensive Operations. Instructions of January, 1916.....	103
2d. Opinions at the Beginning of 1916.....	115
3d. The German Offensive Against Verdun (21 February, 1916).....	118
4th. The Allied Offensive on the Somme (1 July--and of November, 1916)....	139
5th. Lessons on the Offensive.....	147
6th. Lessons on the Defensive.....	154
7th. The Instructions of the End of 1916. First Attempt to Conciliate Method and Rapidity to Enhance the Exploitation of Success.....	161
Conclusion.....	168

CHAPTER V

THE YEAR 1917 -- EXTREME SOLUTIONS

First Phase. -- The Joint Anglo-French Offensive in Artois and on the Aisne (9 April--15 May, 1917).....	173
I. -- The Preliminaries.....	173
II. -- The Conception of the Commander-in-Chief Based on Rapidity.....	177
III. -- Review of the Offensive of April, 1917.....	179
IV. -- The Results.....	180
V. -- Conclusion.....	182

<u>Second Phase.</u> -- The Limited Objective Offensives.....	184
I. -- The New Directives of the Commander-in-Chief. Method Again Takes the Ascendant over Rapidity and Continuity.....	186
II. -- The Reaction Against the Instruction of 16 December, 1916. The Amendment of 27 July, 1917 to that Instruction.....	191
III. -- The Limited Objective Offensives of the End of 1917.....	195
IV. -- The Instruction of 31 October, 1917. The Triumph of Method. New Conception of Continuity.....	205
V. -- Defense of Positions.....	215
VI. -- Conclusion.....	226

CHAPTER VI

THE YEAR 1918 -- THE BREAK THROUGH OF FORTIFIED POSITIONS AND THE RETURN TO OPEN WARFARE

<u>First Phase.</u> -- The Great German Offensives of the Spring of 1918.....	232
I. -- The German Offensive Doctrine. New Attempt to Con- ciliate Method and Rapidity.....	234
II. -- Its Application to the Great Spring Offensive of 1918.....	243
III. -- Conclusion.....	255
<u>Second Phase.</u> -- The Victorious General Offensive of the Allies.....	257
I. -- First Engagements in the Open.....	257
II. -- Return to Simple, Audacious and Rapid Procedure.....	264
III. -- Application to the Offensive Operations of 1919 and the Return to Open Warfare.....	267
IV. -- Defense of Positions.....	272
V. -- Conclusion.....	278

CHAPTER VII

THE POST-WAR DOCTRINE AND THE NEW REGULATIONS

1st. General Lessons of Open Warfare.....	283
2d. General Lessons of Position Warfare.....	296
3d. Present Conception of the Offensive.....	312
4th. What Our New Regulations should be.....	319
5th. Conclusion.....	328

PRESS OF BERGER--LEVRAULT, NANCY-PARIS--STRASSBOURG.

INTRODUCTION

It is natural that after each war an effort should be made to bring out the lessons of the war which may modify combat methods and so require change in regulations. The war of 1914-1918 is so rich in innovations of every sort that it is with great embarrassment that such a study, so vast and complicated is approached; however, such a study is urgent for two reasons.

First of all our pre-war regulations are no longer up to date and should be harmonized with the progress which was made during the war and which experience has confirmed. Many officers really imagine that these regulations no longer have any value and that they should be replaced by entirely new documents; that is true if we consider only the regulations of the separate arms; but if we consider regulations of a more general character such as Instruction on the Conduct of Large Units of 28 October, 1913 (1) and the Decree on the Service of Armies in the Field of 2 December, 1913 (2) we soon realize (and we will show this by what follows) that they are far from having lost all their value. As far as these latter are concerned, it is more of a question of bringing them up to date than of their complete renewal.

The second reason which demands a recasting of the regulations is that the documents of every sort which were published during the war, either on the employment of large units in battle, or on combat methods of the different arms and the liaison between arms, no longer exactly cover the case; this can be explained.

The regulations on instructions which were published during the war were intended to bring our methods of attack or of defense into accord with the material means which we had available at different stages of that war; and, as we all know, these material means continued to increase and to improve. In fact, according to the progress which had been laid down, they were not to attain their maximum until the spring of 1919 (3). The end of the war, or rather the armistice, arrived before the troops could be provided with all the materiel with which it was intended that they should be equipped. Now and in the future, this maximum materiel, which the (war time - Tr.) regulations and instructions could not then take into account, must be considered. This requires that they be brought up to date.

But the considerable task of revision and recasting is not incumbent alone on the technical commissions charged with the reissuing of regulations. It also concerns the High Command on all questions of a general order and, since we must use the expression, on all questions of doctrine. It is then logical that the High Command should be charged with the bringing up to date of those regulations which are of interest to all the arms (Conduct and employment of larger units and field service regulations), while the work of recasting only the regulations particular to each arm or dealing with the liaisons to be established between them should be left to the technical commissions. It is at once evident that the commissions will be able to start their own work with benefit after being received from the High Command the necessary directives as to the use of the combined arms.

-
- (1) L'Instruction sur la Conduite des grandes unités du 28 Octobre 1913.
 - (2) Le Decret sur le Service des armées en campagne du 2 Decembre 1913.
(These contain the basic doctrines in force at the outbreak of the war-Tr.).
 - (3) On this subject, it is of interest to note that the military effort of the Allies in personnel (excepting for the Americans) reached its maximum in the spring of 1917, while their production in materiel was not to reach its maximum until the spring of 1919.

The High Command, if it is to lay down at this time the basis of our doctrine of war, in order to take up the question of the employment of larger units, must be informed of their number and above all of their composition both in war and in peace. Here we approach the question of the reorganization of the army, the term of military service, general mobilization, all of which indicates the importance and the urgency of the solution of the problem of the reorganization of the army, which must first of all be settled.

VII So it seems natural to divide the great task of military reconstitution:

Between the Parliament, charged with voting the laws for the reorganization of the army;

Between the High Command, charged with establishing our doctrine of war and with settling on the rules for the conduct of large units;

Between the technical commissions, charged with the elaboration of the regulations for the employment of the different arms.

To complete the work well, rationally and without useless loss of valuable time, the work should be conducted according to the plan above indicated.

---oOo---

Already many studies on the important question of the recasting of the regulations have appeared.

As soon as hostilities ceased G.H.Q. (1) stated its opinions in a number of documents on the subject of the organization of the army on a war footing and on the role and the employment of the various units of the different arms in battle. But at that time it was not known what the army was to be on a peace footing; this is why those studies, although very valuable, no longer exactly meets the present requirements.

Later, the Minister of War, wishing to provide the different arms with provisional regulations, without waiting until the Parliament should have legislated upon the reorganization of the army, invited the officers, and those of assimilated rank, of all grades of the active army to express their personal opinion upon a certain number of questions which were states (Circular, 29 December, 1919). But that consultation, somewhat limited, since it excluded all the officers of reserve, had the inconvenience of limiting the nature of the subjects to be treated and of submitting the studies, which had been prepared, for the appreciation of Commissions which were charged with preparing a general report.

Outside of official channels, many officers have published studies on the several events of which they were witnesses and have sought to draw lessons for the future from them.

III Finally, the Minister has had published a certain number of regulations, such as the Instruction on the Conduct of Large Units and the Regulations for the Maneuver of the different arms. But these documents being only of a provisional character are destined to be revised.

It seems then that it is not too late to submit a contribution, no matter how modest it may be, to that great work of reshaping the regulations.

(1) G. O. C. - Tr.

It has seemed interesting, in order to picture the situation in its entirety, to follow the evolution of tactical ideas, as the war progressed, in Germany, as well as in France; and in order to deduce true lessons, to study the relations of the facts in the case with the results which were obtained. (2)

We should but expect, after five years of fighting against the most redoubtable of enemies, particularly as we were victorious, to look for the basis of our doctrine of war in the lessons of Experience. Experience is superior to any abstract discussion in its ability to bring out the sources of conception and in indicating the possibility of execution. The commander must firmly keep in mind this possibility of execution of his conceptions if he does not wish to expose himself to the possibility of ordering the impracticable; which would be the gravest and the most dangerous of mistakes, for, according to Ardant du Picq, "an order for the impracticable is a definite blow to discipline".

In order to follow the evolution of ideas and methods as new problems were presented, we have thus been led to make a rapid review of the principal events of the war.

In order to draw practical conclusions, it seems natural to take as our point of departure the doctrines of war which were in force previous to 1914 both in France and in Germany; then to present the modifications and transformations in these doctrines during the progress of the years of the war. Each of these years presents a character of its own.

X The summer and autumn of 1914 is a period of open warfare (1).

The winter of 1914-1915 and the year 1915 mark the beginning of position warfare, and is a period of experiment and groping.

The year 1916 is the period of perfecting of our offensive and defensive methods.

The year 1917 is modified by the adoption of extreme solutions for the offensive.

Finally, the year 1918 witnesses the rupture of the fortified positions and the return to open warfare.

This study, as its title indicated, should be strictly limited to a presentation of tactical questions which come up; but these are so often so closely related to those of a strategical nature, that in spite of a desire to avoid strategical questions, when discussing subjects of a general nature and in order better to bring out our ideas, we have made some incursions into the domain of strategy.

It should be well understood in all that follows, that our object is not to bring more or less critical judgment against men or facts. It is truly too easy, once the events have been made known and when we know what happened on both sides, to pronounce judgment on the dispositions which were made or on those which should have been made. Our sole intention is to draw from the events the lessons which they seem to contain for the future, while considering only in the abstract all questions of the personnel engaged in those events.

(2) Aside from official documents, we have drawn to a great extent upon the works of Captain Koeltz on the German offensive and defensive tactics, as well as upon Captain Bottes study on the evolution of field fortification.

(1) We use the term "open warfare" rather than that of "war of movement", which is often improperly used, in order to better express the distinction between the latter and "position warfare", or trench warfare.

THE EVOLUTION OF TACTICAL IDEAS

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FRANCE AND GERMANY

DURING THE WAR OF 1914-1918

CHAPTER I

THE PRE-WAR DOCTRINE IN FRANCE AND IN GERMANY

I - OUR DOCTRINE OF WAR PRIOR TO 1914.

Some have represented that the French Army, on the eve of the war, was still without a well established doctrine; others have represented that the doctrine which had been taught broke down and that it was to a great extent responsible for our early reverses.

To get some idea in this respect, we need only examine our pre-war regulations:

The Conduct of Large Units, 28 October, 1913. (1);

The Decree on the Service of Armies in the Field, 2 December, 1913 (2);

Regulations for Infantry Maneuver, 20 April, 1914 (3).

Here will be found the necessary indications on the conception and execution of operations, the sum of which make up what may be called a doctrine of war, for the use and guidance of the commander as well as of the executants.

A. The Conception of Operations.

(2)

Starting on the first page, the Conduct of Large Units indicates the object to be obtained: "The purpose of military operations is the annihilation of the organized forces of the enemy". For, they add, "the great numbers which are employed, the difficulty of re-supplying them, the interruption of the social and economic life of the country, all urge that a decision should be sought within the shortest possible time so as to promptly end the fighting".

And now as to the means: "Decisive battle, exploited to its utmost, by the destruction of his armies, is the only means of bending the will of the opponent. It constitutes the essential act of war".

And again: "To conquer, the combat dispositions of the enemy must be broken by force".

Again: "The offensive alone leads to positive results by seizing the initiative in operations we take control of circumstances instead of submitting to them".

"The passive defense is doomed to certain defeat; it is to be absolutely precluded".

From this we can see no excuse for hesitation; the means to be used to conquer is the offensive, and exclusively the offensive. Furthermore, the Report submitted to the Minister explains further:

(1) La Conduite des grandes unites du 28 Octobre 1913.

(2) Le decret sur le Service des armees en campagne du 2 Decembre 1913.

(3) Le Reglement de manoeuvres de l'infanterie du 20 April 1914.

"Of all the nations, the military history of France offers the most striking examples of the great results which are produced by a war of attack, as well as of the disasters which are brought about in a war which is conducted in a waiting attitude. Developed by us almost to the point of perfection, the doctrine of the offensive has won for us the most glorious successes. And, in cruel proof of the opposite the day when we ceased to realize this truth, this doctrine neatly provided our opponents with the weapons with whose aid they conquered us.

"The teachings of the past have borne fruit: the French army has returned to its old traditions, and no longer recognizes any law in the conduct of operations but that of the offensive.....

"Following the South African war we saw reappear certain theories which we had a right to believe had been abandoned forever, on the inviolability of fronts and on the possibility of producing a decision (3) by maneuver and without battle. It is true that shortly after this the Russo-Japanese war came along and gave a striking denial to these dangerous theories; but we must always be on guard lest a long period of peace may again produce them.

"In order to prevent any such backward step, the regulations are insistent in keeping always in view that primordial law that battle, the exclusive purpose of operations, is the only means of breaking the enemy's will, and that the first duty of the leader is to have the will to engage in battle".

From the strategical point of view, then, the conception of operations is definitely oriented towards the offensive.

B. The Execution of Operations.

The Conduct of Large Units for the group of armies, the army, corps; and the army, and the Service in the Field for the division and smaller units cover the application of the principle of the offensive in battle by groupings of all arms. But here we note the introduction of the idea of the defensive which, in certain cases and for certain elements only, may be admitted. Furthermore, here is how the report of the Commission, which was charged with presenting to the Minister the decree of 2 December, 1913, expresses itself in order to justify the eventual employment of the defensive:

"In order to avoid all misunderstanding upon a point of doctrine of such importance, the new regulations admits of but a single justification for the defensive in battle; that is the necessity to economise troops at certain points with a view to providing greater forces in the attacks.

This understood, the defensive is really nothing more than an auxiliary of the offensive".

Furthermore, referring to the army corps, tactical organ of execution, the Conduct of Large Units pictures the case where the situation may require taking up the defensive on all or a part of its front:

"The purpose of the defense of a front then is to cover the assembly of the means before passing to the attack, or to contain the enemy on that front with reduced numbers in order to provide more force in the attacks".

(4) In its turn, the Regulations for Infantry Maneuver, 20 April 1914, prescribed all the procedure to be used in battle, in the offensive as well as in the defensive, since the latter case might come up.

But it must be clearly noted that we are no longer considering the strategical purpose of operations. With the army corps, organ of execution, and lower units, we enter the domain of combat tactics, where the defensive is permitted with the above indicated reservations.

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It can not be said then that prior to 1914 the French army did not have a well established doctrine of war. On the contrary, from top to bottom, in all grades, it was very sharply oriented toward the offensive; strategic offensive, to the absolute exclusion of the defensive; the tactical offensive and eventually the tactical defensive in certain localities for the purpose of helping the offensive in other localities.

C. OPINION IN MILITARY CIRCLES BEFORE THE WAR.

We have seen what our doctrine from the theoretical viewpoint was. It may not be out of place to make a rapid survey of our doctrine in actual practice. I wish to touch on "the state of mind, the general channel of thought" of the officers (to use Colonel de Grandmaisons expression) which will give a fair reflection of the doctrine.

In all our work, maneuvers on the map as well as on the terrain, there was never a question of anything but the offensive and of the attack. We took up the question of halts, because the march could not be kept up indefinitely both day and night, but even in this connection we hardly studied anything of the situation beyond the question of outposts. Sometimes we took up the delicate question of retrograde movements, but it must be freely acknowledged, that the word defensive had such a bad sound to our ears that we would not have dared to present a defensive situation in a map exercise, much less in a maneuver on the terrain. Consideration of the defensive, that is the utilization of terrain by weak effectives so as to resist a numerically superior enemy, was almost solely limited to the troops who had the mission of covering the mobilization (les troupes de couverture). In practically all other cases, anyone who might have attempted to make a closer study of this important question, either with the officers and noncommissioned officers or with troops, would have put himself in an unfavorable light.

Our corps of officers had absorbed the theory of the offensive to the point where it had become a disease; it was the offensive in every case and in spite of any situation, the offensive blind and to the limit, (l'offensive a entrance) which was to give a solution in every situation.

As a result, we did not pay enough attention to the effect of fire, we went on using formations which were too dense, we neglected liaison; all this was done in order to make speed, for, according to our way of thinking, once the attack was started the question of its progress being stopped need not be considered.

And it was with these general ideas and habits that the French Army was thrust into battle; it threw itself into battle with an ardor which was superb, but with a disdain for fire for which it had to pay dearly.

D. WHAT OUR REGULATIONS PRESCRIBED ON THE DEFENSIVE.

Having stated how our corps of officers understood and practiced the theory of the offensive, we must now return to our regulations.

It is true that these regulations, as we have seen, foresaw the employment of the defensive only in a single case. But at least they had foreseen its use. As a consequence, there were prescriptions in force which it would have been well to know and to practice, once the situation developed where we were forced to hold the enemy not only strategically but tactically.

We find the general ideas on the organization of a defensive position in the Hand Book for Engineer Officers (1). That organization is based on echelonment in depth. There are contemplated:

(1) L'Aide - Memoire de l'officier du genie.

1st. An advanced position, intended to slow up the enemy and so give the troops in rear time to take up their combat dispositions;

2d. A principal position of resistance, which should stop the enemy;

3d. A second line position, intended to limit the advance of the enemy, in case he breaks through the principal position of resistance.

(6) It will be seen that this echelonment in depth corresponds to the echelonment of forces prescribed for security at the halt; the advanced position has the same mission of observation as the outguards and sentinels; the troops of the principal position of resistance, like those on the line of outpost supports, have the mission of stopping the enemy; and finally it is from the second line position that counter attacks are to be launched just as they are expected to be launched by the outpost reserves. That echelonment was then a logical arrangement; and it is of interest to note that, after abandoning it for a great part of the war, we had to come back to the application of the same idea in the course of the summer of 1918.

The principal position was expected to be made up of two lines; one for the infantry, the other for the artillery. The infantry line was made up of a series of strong points, separated by intervals of not to exceed 1,200 meters, covered by flanking fires delivered from the strong points in question. These points were made up of Centers of resistance or supporting points (1); A center of resistance might include one important strong-point or several strong points which were close together.

This disposition, not only facilitated command (the units being grouped within the strong point under the immediate command of the commander of the strong point), but also favored economy of effectives in the defense.

The division commander organized his front so as to reduce to a minimum the number of men needed for its occupancy.

This organization was to be governed by a combined plan and was to be developed as far as the time and means available might permit. It provided for the organization of centers of resistance, to each of which an infantry garrison was assigned; it provided for the selection of artillery positions which would flank the centers of resistance, to fire in the intervals between them and the approaches to them, as well as on the possible emplacements of hostile artillery. Reserves are held in rear. (Regulations for Service in the Field, art. 112).

An infantry unit which is given a defensive mission received an order for the defense which precisely defines the task to be carried out, the part of the terrain upon which the resistance will be organized, how that organization is to be carried out, the probable time available, the material means with which it is to be provided (light tool wagons, or heavy tools....), the designation of the command post of the next higher unit and the liaison to be established either with that command post or with neighboring artillery units (Regulations for Infantry Maneuver, art. 338).

So much for generalities, we will now examine some of the details of the preparation of the defense.

First we have reconnaissance, which is to include, not only the terrain to be occupied, but also that which the enemy must traverse (points he must pass, paths, defiles, etc.), and particularly reconnaissance of practicability of the terrain for counterattack and even for the resumption of the offensive.

Then there follows the defensive organization of the positions which have been selected; this is assigned to the infantry troops who are to occupy them, reinforced, when necessary, by detachments of engineers. This organization

(1) Centares de resistance on des points d'appui. The strong points previously referred to strong tactical localities, which were made up of centers of resistance and supporting points; the supporting point (point d'appui) is equivalent to a strong-point in our terminology, and is hereafter so translated. - Tr.

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follows a general plan and is executed progressively. "A methodical preparation of the defensive includes the organization of the positions which the troops are to occupy, the organization of defiladed communications, telephonic communication, and, when necessary, successive lines which allow a first success to be halted and an offensive return to be prepared The best works are the simplest, those which make use of the natural accidents of the ground, which avoid enemy observation or which are inconspicuous The trenches should be deep and narrow, spoil should be hidden from observation. Simulated trenches may be used to draw the enemy's fire on sections not occupied by troops of the defense." (Regulations for Infantry Maneuver, art. 343 and 344).

The infantry should clear its field of fire, carefully record ranges and locate its machine guns so as to flank important parts of the front and to beat distant parts of the terrain over which the enemy is obliged to pass.

Finally, projectors are to be installed for night work.

The assignment of troops to the defenses is a function of the organization of the terrain.

(8) "Sound and judicious organization allows a reduction in the effectives to be used on a front and allows a greater force to be held in rear for counterattack... Only the battalion and stronger units have the means necessary to provide both the defense and the counterattack." (Regulations for Infantry Maneuver, art. 341).

As to the execution of the defense, there is one principle WHICH IS ABSOLUTE: the division must hold till the end, even if it is completely sacrificed (art. 112, Service in the Field); and the Regulations for Infantry adds (art. 337): "An Infantry unit whose mission it is to hold a point of terrain must never abandon it without an order. It will resist to the end; each man will die in place rather than give ground. If the enemy forces the unit back, it uses every means to regain the lost ground."

The Infantry occupies its combat positions, is hidden from observation, is sheltered from fire and acts by fire power.

The artillery may intervene by long range fire, and above all it must be prepared to fire on the hostile infantry.

Counter attack units generally operate in accordance with a preconceived idea and independently of the incidents of the battle. This preconceived idea for their use will generally require the use of such terrain which is most suitable for counterattack. "Prepared under cover, generally in rear of the intervals in the line of resistance, every effort is made to launch the counterattack as a surprise. It is pushed forward with resolution, combining fire and movement as laid down for the attack." (Regulations for Infantry Maneuver, art. 347). Counterattacks are the province of the local commander or of the superior commander; they are so organized as to insure the infantry which executes them the assistance of the other arms.

Finally, if the enemy succeeds in taking a part of the line, the preoccupation of all should be to prepare vigorous offensive returns to eject him from the terrain which he has conquered. This summary review will permit us to note that, if our troops had been well acquainted with and had properly applied these requirements of the regulations, they would have very readily adapted themselves to position warfare; as a matter of fact, they contained the germ of most of the ideas which we believed we afterwards discovered and which have been confirmed by the experience of the war. But, we must certainly admit these ideas were not sufficiently disseminated and sometimes they were even ignored.

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(9) E. WHAT OUR REGULATIONS PRESCRIBED ON THE OFFENSIVE.

The prescription relative to the offensive are too long for us to analyze; we will limit our discussion to a few words:

On the importance of fire effect;

On the support of the infantry by the artillery;

On the necessity for liaison;

On the use of field works;

On the precautions to be taken against aerial investigation.

1. IMPORTANCE OF FIRE EFFECT. - Our power regulations did not fail to foresee the effect of fire. Did not the report which preceded the regulations for infantry maneuver say: "The experience of the most recent were given abundant proof that the continued increase in the rate of fire and of the flatness of the trajectory of the infantry projectile, and the continued increase of the rate of fire and the power of artillery fire expose troops to destructive effects which are becoming more and more redoubtable, which requires them to use very supple formations which may be rigorously adapted to the terrain. Experience equally proves the greatest importance of fire for the support of movement, which alone is decisive and irresistible, and which alone is capable of producing victory".

In its turn, Service in the Field lays down the principle (art. 97) "the power of the present armament makes any attack, in dense formation delivered in day-time over open terrain, impossible. The vigor of the offensive can be maintained only by the use of supple formations which are as little vulnerable as possible. The infantry therefore fights as skirmishers".

The Regulations for Infantry Maneuver accordingly prescribed that progress under fire should be made by a chain of skirmishers, made up of sections deployed in single rank, the men generally being at one pace interval. It added "A greater density would decrease the efficient delivery of fire and would decrease the rapidity of movement".

(10) Finally, the Conduct of Large Units (art. 119), as well as Service in the Field (art. 104) foresaw the engagement of an enemy in position. "When the enemy has been able to arrange all his means of action on terrain which he has organized, the general conduct of engagement must be methodical. Furthermore more time is then available, and a minute reconnaissance of the hostile front before proceeding to the attack with the bulk of the force becomes indispensable." (1).

2d. THE SUPPORT OF THE INFANTRY BY THE ARTILLERY. - Conduct of Large Units says (art. 111): "In the army corps, battle implies constant and close cooperation of the different arms", and further (art. 125): "The primary mission of the artillery is to support the forward movement of the infantry. Particularly in the crisis which precedes the assault, at all costs it places fire on the objectives of the attack". That is the principle. Let us see how the Service in the Field applies this principle to the division in battle (Report to the Minister).

"Until a few years ago, it was considered that the first duty of the artillery in battle was to gain fire superiority over the hostile artillery, after which its role was to prepare the infantry attacks by riddling with projectiles the objectives which have been assigned to those attacks, before the infantry enters into action. Today it is recognized that the primary role of the artillery is to support the infantry attacks by destroying everything which opposes

(1) The French make a distinction between contact, engagement, and attack. We usually refer to contact and attack; the steps included in engagement correspond to our term developing the enemy. - Tr.

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the progression of such attacks. The only purpose of seeking fire superiority over the hostile artillery is to insure the use of the maximum power against the objective of the infantry attack.

Artillery fire has only a very limited effect against an enemy protected by shelter; to force such an enemy to uncover himself, he must be attacked by the infantry. Therefore preparation of attacks by the artillery can not be carried out independently of infantry action. The cooperation between the two arms must, therefore, be constant. The artillery no longer prepares attacks, it supports them".

And article 98 of the Decree adds; "It is the division commander's duty to assign, in accordance with the situation at different times in the battle, the general objectives which the artillery is to take under fire so as to give the infantry the most efficient assistance. During the attack the artillery fires upon the objectives against which the Infantry is advancing."

Thus the exclusive mission of the artillery is to support the infantry attacks by destroying the obstacles which oppose its advance (which may require counterbattery), but not to prepare those attacks by preliminary fires on the objectives which have been assigned to the infantry.

3 d. Necessity for Liaison. -- Some time before the beginning of the war, we had taken up the question of liaison in battle; and serious steps within the limits of the means available, had been taken towards its organization. The Conduct of Large Units prescribes the basis of that organization (art. 49). "The object of liaison is the coordination of effort, by assuring the continuity of communication between commanders of units which are engaged in the same operation.

Liaison is established:

"Between the commander of a unit and his immediate subordinates;

Between the commanders of units operating in neighboring zones of battle;

"Liaison of the first category allows the commander to transmit his instructions and orders, to supplement them when necessary; and, on the other hand, to receive information, reports and returns, which by degrees clears up the situation and thus provide him with the elements of his further decisions.

"Liaison of the second category permits an exchange of information which enables neighboring units to combine their efforts towards common success and to mutually support each other.

"In the same way, every subordinate should establish liaison with his immediate superior".

From a material standpoint, liaison is established by using communications of various sorts. They may be supplemented by sending out staff officers or liaison agents.

"The command post of the army commander is selected with a view to the facility and the rapidity of liaison." (art. 90).

The Service in the Field lays down practically the same prescriptions (art. (12) 23), and adds (art. 121):

"The closest liaison in battle between the various organs of the command is an essential guarantee of success; it is a necessity of primary importance".

The liaison between organs of the command is insured by the use of liaison agents (officers or noncommissioned officers). Furthermore, the Regulations for Infantry Maneuver says, "during the whole course of the action; the superior commander should be kept informed of all events which might be of interest to him". (art. 377).

As to telephonic communication and communication by signal, the Service in the Field states (art. 24), they should be established, "Whenever the troops make a halt which is long enough to establish them (in battle, during long halts, in outposts)".

Finally, the liaison between infantry and artillery, which had been the subject of numerous studies and experiments, was practically provided for only by the community of missions which were assigned to the two arms. Again it is the Service in the Field which makes provision for it (art. 109). "Every attack requires close cooperation of the infantry and the artillery. The division commander insures the liaison between these two arms by the missions which he assigns to them".

Our attention then had been directed solely towards liaison within the higher units; no practical method had been laid down in regulations for liaison within the lower units. However, we find in the Regulations for maneuver (art. 396), on the subject of the battalion in the defense, the following prescriptions, which it is true are rather vague, but which show that liaison within units had been foreseen:

"In action the battalion commander is in close communication with his captains", with the colonel and often with the artillery commander. This communication is maintained by telephone, the optical telegraph, signals or by liaison agents who take advantage of defiladed routes.

His principal concern is to assure the convergence of the fires of the infantry and of the machine guns on those parts of the terrain where the enemy's attacks may most easily progress, and to produce convergence of effort, particularly with the artillery".

Likewise, on the subject of the attack, the Regulations for Maneuver of Field Artillery of 1910 said: "When the mission of a battalion to give particular support to a designated attack, its commander gets in touch with the commander of the infantry unit which is to make the attack. That preliminary understanding between the executants is the foundation of liaison. During the execution of the operation, the artillery commander takes every possible measure to maintain communication with the infantry commander. The most certain means are: first, by sight, then liaison agents and in certain cases by relays of signals".

We still did not think of making use of aviation as a means of liaison; this was an army service which specialized in missions of distant reconnaissance and in observation.

4th. - Field Works. -- Our regulations (The Service in the Field as well as Practical Instructions on Field Fortifications, 24 October, 1906, modified 28 October, 1911) not only had foreseen the necessity for field fortifications, but had also recommended their use.

Fortification of the battlefield is divided into light field fortification, particularly performed by the infantry, and into heavy field fortification, which more particularly concerns the engineer troops.

Both are used in the offensive as well as in the defensive; their purpose is (Service in the Field, art 144 and 145).

- 1st - To facilitate the advance of the troops;
- 2d - To increase the battle resistance of a unit which is temporarily held up;
- 3d - To allow a force which is on the defensive to use the terrain to the best advantage.

"In the offensive, conquered terrain must never be abandoned. In open terrain, when a line of skirmishers can no longer advance it sticks to the ground, and covers itself by throwing up a protecting mask of earth when necessary. These

original works are perfected by reinforcements and available units who accessively occupy them. Whenever a unit is forced to remain in place for the night, it takes advantage of darkness to reinforce the organization which has been commended. Every strong-point which is captured during the battle is immediately organized and occupied so as to be able to put up a serious resistance to offensive returns".

In the defensive, the centers of resistance and strong-points are organized as was pointed out in the discussion of the defensive. Service in the Field adds (art. 146): "Positions on the edges of localities or woods which are exposed to hostile artillery fire are to be avoided; on the contrary, the edge of a woods which hostile artillery fire cannot reach a very strong supporting point. The batteries are protected by more or less elaborate works; if need be they are completely dug in".

Field fortification, as thus understood, is to be considered a supplementary arm to all troops in the attack by furnishing protection during halts; as well as to all troops on the defensive by reinforcing them against the enterprise of the enemy. It is intimately connected with maneuver and with fire and is always subordinate to the application of the general rules of combat.

Unhappily, we never took up the practice of fortification. It was represented that once a man dug in behind, even more or less hasty shelter, it would be rather difficult to get him to go forward again under fire. We usually did not have the terrain which troops could be permitted to dig up at will; and when by chance such terrain was available, the necessity for refilling the trenches after having dug them, was excuse enough never to dig them. And, in most cases, we were satisfied with two or three practical exercises in field fortification for the recruits; and then nothing more was said about them either in practical exercises or in maneuvers for the rest of the year.

5th - Precautions to be taken against aerial investigation. - Article 69 of Service in the Field foresaw measures to be taken to conceal troops from hostile air observation; they will be quoted in full. "On the march, when warning is given of a hostile plane, the open parts of the road will be vacated; the turfed sides of the road or the part bordered by trees will be used, preferably the side away from the sun. When necessary, infantry and cavalry march in the ditches. In addition to roads, air observation is attracted particularly by large masses and troops in movement. Woods, orchards and hedges are used as much as possible; in open terrain formations are extended and then

"In cantonment, the presence of troops is generally disclosed by packs and fires. Grouping of vehicles which disclose regular lines must be avoided. Vehicles are placed under sheds, trees, in barn yards or in lines alongside houses or hedges, avoiding at the same time blocking of circulation.

"Kitchens are placed, as far as it may be possible, within houses".

F. Is our doctrine responsible for our early reverses?

If we have dwelt at length, and perhaps beyond reason, on the prescriptions of our old regulations, it is because they give us the necessary data to discuss the foundation for the allegation that our doctrine was to a great extent responsible for our early reverses.

Our reverses can not be attributed to our strategical doctrine, but what of our tactical doctrine?

We must at once admit that it was not perfect.

While acknowledging the extreme importance of fire and its redoubtable effects, our regulations, perhaps, did not present the enormous influence which this fire might have upon the progress of an attack; the order and method which it demands if we wish to avoid bloody losses; and consequently, the slowness which it forces upon all offensive movements. It seemed rather to be absorbed with the rapidity

of movements, as if above all, everything which might restrict the natural dash of French temperament must be avoided. This was a very laudable conception, but, unhappily, it was one which no longer could hardly be put into practice against the fire of modern weapons. Briefly, the regulation which was accepted, although not formulated, is that, in battle, rapidity takes precedence over order (the opposite of that which later was produced by the war).

Whence our early errors in tactics:

Poorly considered attacks, often totally lacking in coordination in which everything was sacrificed to rapidity of execution;

(16) Combat formations, still too dense;

Insufficient support of the infantry by the artillery, as a result, in part, of the lack of practically any effective liaison;

Inaptitude for and general repugnance to using the intrenching tool and for fortification.

Nevertheless, as they were, those pre-war regulations were adequate (we hope we have demonstrated) to allow us to adapt ourselves to the new conditions of battle. We have quoted certain expressions which seem to have been a presentiment of what that war was to be. Here is still another which should have directed our minds towards an idea of the length of battles, of the succession of attacks to be made and of the efficacy of the counter-offensive.

"Due to the power of armaments, which makes the approach difficult and the beginning of engagement costly; due also to the frequent employment of the resources of fortification, which necessitates renewal of attacks battles may be prolonged for several days For a large unit, a decisive result can rarely be obtained as a result of the first blow. That result is obtained only by stages, by taking a series of intermediate objectives one after the other; the attempt to accomplish several results at the same time, leads to dispersion of effort and diminishes the chances of success." (Conduct of Large Units, art. 82 and 13)).

"In the face of an adversary who has seized the initiative of operations, it is still a violent and energetic counter-offensive which can give a favorable turn to the battle". (Art. 6).

Would one not believe that these lines, which date from 1913, were written with the experience of all that the war taught us about attacks, and after the lessons of events such as the battle of the Marne and the counter-offensive of 18 July, 1918?

Be that as it may, it is indeed certain that trench warfare had not been foreseen; by the Germans no more than by us. Furthermore, in every age, wars have brought their surprises. Even in 1870, Moltke did not realize the effects of our chassepot until after the first engagements.

On the morning of 16 August, 1870, General von Alvensleben, commanding the III Corps, said to General von Pape, commanding the 1st Division of Foot Guards: "The (17) fire of the Chassepot, and to a certain extent, that of the machine gun, have been underestimated. It is impossible for us to make any progress by means of our maneuver terrain tactics; we must make more use of maneuver, make more extended developments and make use of the least cover in open terrain; particularly, we must make long and continuous use of our artillery".

And General von Freytag-Loringhoven, who quotes that statement in his Deductions from the World War", adds: "The fact that exercises in time of peace furnish no real loss of the efficacy of the enemy's fire will play an important part in the beginning of every campaign. Even the most perfect military training cannot protect us against that which we can not calculate and which confronts us in campaign. It can only meet the exigencies of circumstances in a limited way".

It was then very difficult to escape that general law; however, the South African War and the Russo-Japanese War should have been able to open our eyes to the efficacy of fire and the employment of fortification. But, in France as well as in Germany, as General von Freytag notes, "the general tendency was to consider the case of close fighting (from trench to trench) as exceptional, and to explain it as a result of local conditions or of national characteristics of the parties engaged; and to consider the normal distance of infantry combat as being from 300 to 400 meters". (1).

But even admitting that our regulations, in spite of their effort to produce a quick decision, had foreseen the situation of trench warfare, it is not sure that the operations would have taken on that special form if circumstances had not forced this form of warfare first on the Germans and later on the Allies.

(1) "If digging in was the custom in the Transvaal and in Manchuria", wrote General von Bernhardt, "It is because the Boers were fighting a war of delaying actions, similarly the Russians and even the Japanese were often reduced to the necessity of using the spade by the dragging out of the war, they were forced to the defensive by the difficulties of communications which delayed the arrival of reinforcements and supplies. But in war of the future, field fortification will remain of exceptional use."

A single military writer, at least to our knowledge, pictured trench warfare, the stabilization of fronts; that was Colonel Feyler of the Swiss Army, who wrote, in May, 1902, on the subject of the "Battle of the Future".

"If the two forces are equal in armament, in effectives and in morale, it is evident that they are also equal in their tactical condition. There soon ceased to be a side which attacks and a side which is attacked. The two enemies soon find themselves, in a way, contending for the same thing. They become immobilized like troops who are defending an intrenched camp those who are engaged in the investment.

Outside the chain of forts and protected by their cannons, sortie troops may move about and attempt raids. But the garrisons of the forts and the detachments which guard the works of contrevallation remain inactive and are in a way neutralized.

This is the character which we must assume for the defensive battle we must assume for the defensive battle of the future. We may imagine the situation as placing two human walls face to face and almost in contact, separated by the thinness of peril; and that double wall will remain almost immobile, in spite of the will to advance which one or the other side may have, in spite of the attempts which are made to win success.

One of these lines, not being able to succeed in front, will attempt to overlap the other. The latter, in its turn, will prolong the front and there will be a race to see which can extend the most, limited by the availability of effective. At least that is what would happen if development could go on indefinitely. But nature presents obstacles. The line will stop on a strong supporting point, on an ocean, on a mountain, on the frontier of a neutral nation.

Consequently, if these conditions of equality between the two sides are indefinitely maintained; we must expect the decision to come from some outside factors. Among these factors Colonel Feyler already saw the blockade, famine, exhaustion of economic and financial resources, and finally moral uneasiness of population submitted to such an ordeal.

The battle of the Marne might have been a victory for the Germans and that would have been the end of the French army; we would have been conquered after a month's campaign, and the question of trench warfare would never have come up. On the contrary, that battle marking the first serious check of our enemies, forced them to regroup their forces to start a new offensive for the purpose of turning our left wing. To accomplish this, they had to extend their front toward the north; and as there were no reserves available, they had to strip their left and center, which thus weakened, were forced on the defensive. Furthermore, at this particular time the Russian offensive in East Prussia forced the reinforcement of the Eastern army by forces which had to be taken from the western armies; this was another reason for taking up the defensive in France, at least for the left and center of the German forces. Finally, that solution, in any event, allowed them to hold the greater part of the terrain which they had conquered. We see then, that trench warfare had not been premeditated; it came out of circumstances which forced it upon the Germans as the best means of gaining the objectives which they had set for themselves at that time. Falkenhayn formally claims this when he wrote: "The assumption of trench warfare was (19) not the result of a free decision of the General Staff, but a result of the stern pressure of necessity". On our side, the defensive attitude of the enemy, on a great part of his front, put a sudden stop to our pursuit; but it allowed us, by taking the same measures as himself, to create the means necessary to meet the danger of the envelopment of our left wing. Above all, it allowed us to gain time, which was a powerful factor which was to play such a great part in the success of the Allies.

And thus was born trench warfare, which was seen to extend over the whole front of the armies which were facing each other.

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In leaving this question of our pre-war doctrine, we may say that our early reverses can be charged against neither our strategical conception nor our tactical conception of operations. These reverses were primarily due to circumstances, and particularly to the turning of our left wing on the Sambre by an enemy who did not hesitate to violate the neutrality of Belgium.

But we can say that, while being subjected to these checks, we could have diminished our early losses: and here is where the question of the training of the skeleton personnel (1) comes in. We have already mentioned the state of opinion, which was imbued with the idea of the offensive to the bitter and, against anything and in spite of anything, which disdained the effects of fire, and which often had but slight familiarity with the requirements of the regulations. It is true that these prescriptions, far from being perfect, as we have seen, could not have at once given the combatant a clear idea of the realities of the battlefield; but they should have enabled them quickly and readily to adapt themselves to those realities.

It is true that the Regulations for Infantry Maneuver has just been published (20 April, 1914); that is an excuse; but, for the infantry at least, there is another, and that is the possibly exaggerated initiative to which the officers and noncommissioned officers had become accustomed by the preceding Regulations for maneuver, of 3 December, 1904. In fact the report which preceded the regulations of 20 April, 1914, stated in effect: "The question of the revision of the Regulations of 3 December, 1904 would not have come up, had not the practice of nearly ten years demonstrated clearly the necessity of defining methods of instruction and combat methods, so as to allow the officers and noncommissioned officers of lower units to make better use of the initiative which is so largely left to them by these regulations."

In view of the polemics occasioned by recent wars and in the absence of a well established doctrine, it was probably thought advisable to reserve decision by publishing regulations which, instead of imposing settled rules of procedure, authorized full initiative. Also, in each corps experiments had been

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carried out, as a result of which definite rules of procedure had been adopted. When the war came on, our latest regulations (Conduct of Large Units, Service in the Field and Regulations for Infantry) were marking the end of that period of grouping. The officers and noncommissioned officers had not had time to absorb all the details of these regulations. Also, their dash and bravery, which is beyond all praise, but which approached temerity, caused heavy losses which were not offset by the results produced. (1).

To sum up, our pre-war doctrine was in entire accord with logic and good sense as far as an idea of war could be had. Perhaps, from a tactical point of view, it was neither perfect nor absolutely complete; in any case, it was far from being false. Unfortunately, we had not had time to instill it into the military reflexes of the army, to inculcate it into the corps of officers and noncommissioned officers and the troops, whose ideas and instruction were not in complete harmony with it.

C. - The Doctrine of the War College (2) and the function of Staffs.

To conclude this question of our pre-war doctrine, we must mention what has been called the doctrine of the War College, and the part played by the staffs, that is the list of staff eligibles which the War College had crested.

(21) In spite of all that had been said about it, if there is a doctrine which did not break down, it is indeed that which was taught at the War College and which was practiced by commanders and staffs, who in war, are one. We need no further proof than the results produced either by the illustrious leaders who taught there; the Foches, the Petains, the Payolles, the Debeneyes, the Buats, or by those no less illustrious leaders who were taught by them, or, finally, by the body of qualified officers which the school turned out.

It must not be assumed that the doctrine of the War College differed from that laid down by our regulations.

It was exactly the same; only it was taught, not only theoretically, but primarily practically, by means of numerous applications to concrete cases, the study of which created among the officers a veritable community of viewpoint. It was by those special exercises that minds were formed which acquired the habit, so valuable in war, of picturing situations in a similar manner, and of setting them swiftly; so that it could be fairly said that the officers who had gone through the War College had a unity of doctrine. Certainly that is the greatest service that that school rendered to the army.

For, it must be stated, that the corps of officers on the War College list, that is to say the staff, were not very popular during the war. On the contrary, everybody was unanimous, particularly when the Mourier act was being voted upon, in casting aspersions upon them and to glorify the man in the ranks. (3)

(1) How many officers, and those not the poorest, met their death on the first fields of battle, erect and within full view of the enemy, in the midst of bullets and shells, under the conviction that it would have been unworthy of them to seek cover or even to lie down when their commands were at grips with the enemy! This is a sentiment which does them the greatest honor; but it was a false conception of the requirements of modern battle, which took time to change and for which we had to pay too high a price.

(2) L'Ecole de Guerre.

(3) Notre Poilu.

Certainly, there could be no question of detracting from the merits of the latter but, none the less, it should not be forgotten that all the qualities which he displayed were productive only by virtue of the ability of commanders and the knowledge of staffs. It is true that rarely has any one staff officer been singled out for criticism rather than some other; Generally criticism has been levelled at the staff as an anonymous collectivity, irresponsible and little known by the public. The attack was against a collectivity, who, it was known were without defenders.

Such defense, however, need cause no embarrassment.

You don't have to be very familiar with military affairs to know that without a trained staff, any large unit is incapable, not only of gaining successes, but is incapable even of getting into an operation or of executing any orderly movement.

(22) Do we not know that the first difficulties that are encountered in the creation of new armies, is the lack of staff officers? This was the experience in the English, the American, the Greek, the Polish and the Tcheco-Slovakian armies.

Do we not know that the general staff corps, not only produced an array of illustrious leaders during the war; but even more, it paid its debt to the country by heavy casualties. More than 60 per cent of the pre-war eligible list were killed, crippled or taken prisoner.

Do we not know that it was, thanks to the action of the staffs on the movements and morale of the armies, that the strategic retreat in the beginning of the campaign could be executed over such a wide expanse with order and coolness? And was that not one of the elements of success of the counter-offensive at the Marne?

Do we not know that staff officers were to a great extent responsible for the amicable relations, which it was so essential to establish, with the allied armies both in France and outside of France?

And, finally, do we not know that discrediting the general staff is an attack on the whole army, from whose ranks the staff was recruited and to which the members of the staff periodically return to exercise command?

But let us rather refer to the words of one who can speak with more authority than we, those of Marshall Joffre, who, in his speech of acceptance to the French Academy, was not afraid to take up the challenge in the following terms:

"Our general staff corps was our force in the beginning of the war and remained such in spite of the cruel losses which thinned its ranks. I insist upon rendering solemn homage to it here, to its merits, to its honesty, to its conscient, to its knowledge.

"Never during the first weeks of the war, could we have done what we did had not the general staffs of the armies stood like rocks in the tempest, disseminating about them clear thinking and coolness. They surrounded their commanders, upon whom rested the heaviest responsibilities, with an atmosphere of healthy and youthful confidence, which sustained and aided them. They retained, in the most exhausting labors and in the midst of terrific moral trial, a lucidity of judgment, a facility of adaptation and executive ability from which victory was to arise".

(23) The services rendered by the staffs during the war are not sufficiently known, because their work is obscure and ungrateful. Let us hope that History may give them the place in the organization of victory which is their due.

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II. THE PRE-WAR DOCTRINE IN GERMANY.

The German pre-war doctrine is contained in an instruction of 1 January, 1910, entitled: "The Principles of High Command". (1) in the "Regulations on service in the Field of 22 March, 1908 (2) and in the second part of Regulations for Infantry Exercises, of 29 May, 1906 (3)".

Like us, the Germans sought the destruction of the enemy by battle, and by offensive battle, the only form of battle able to produce that result; "A decision will not be secured by the occupation of a zone or territory or by the conquest of a fortified area but only the destruction of the enemy forces. That then is the primordial purpose of operations". And all minds are oriented towards the offensive, which "alone can conquer the enemy". Also, at all times it is a question of the offensive spirit and the spirit of initiative which must be developed especially in the infantry, which plays the principal role and which must be animated with the will to conquer and with the purest spirit of sacrifice. "Only the capacity for initiative in leaders of all grades will allow the movement of masses under the most difficult circumstances and will assure convergence of effort." "Properly applied initiative is the foundation of great successes in war."

No matter what unit we may consider, the favorite maneuver, the form of battle which is recommended, is the envelopment. To win a decisive result, it is not enough to force the enemy to retreat: "An enemy who has been beaten in a frontal attack, nearly always, after a time more or less long, will again be found in your front. Lasting success is assured only when the opponent's retreat is successfully blocked or when he is completely cut off from his communications" (Principles of High Command). And the Regulations of 1906 in its turn lays down the envelopment as a tactical measure; (24) "The combination of frontal attack, with the envelopment gives the best chances of success". The German infantry in its attacks throughout the war did not cease to apply the envelopment, which we thought we discovered in 1918 under the name of infiltration.

The dispositions to be taken up for battle must conform to the principle of mass: "To concentrate all one's forces for any purpose than the decision is a mistake. We can never be too strong for that decision, and the last battalion should be brought on to the battle field".

In the same way, effort for surprise and speed of execution is repeatedly recommended. The attack must never be launched until all the available forces are ready to operate. The Regulations of 1906 states: "If it is necessary to be prudent in the commitment of forces during the engagement for battle, it must also be remembered that perhaps the greatest mistake that can be committed is to place insufficient forces in action at the beginning of a battle and then to reinforce such forces by piecemeal. Such action dooms us to continuously fight with small forces against a numerically stronger adversary, and voluntarily gives up the advantage of numbers.... The advance guard being engaged, every effort must be made to get the main body into line at once and not to begin the artillery fight until the infantry deploys", in order to keep the enemy in a state of uncertainty as long as possible. This is what gave the German attacks their brutal and sudden character.

However, the full fruits of victory can only be gained by the pursuit. By preventing the enemy from making a fresh stand, from assembling, from reorganizing, the pursuit gives results which could only be gained by a second battle..... Every victorious battle should be followed by an unbridled pursuit; each corps commander is charged with throwing all his personality into the pursuit. The exploitation of victory should be pushed to the extreme limit of force".

(1) Les Principes du haut commandement.

(2) Le Reglement sur le service en Campagne du 22 Mars 1908.

(3) Reglement d'exercices pour l'infanterie du 29 Mai 1906.

Finally, the Regulations of 1906 predict that the offensive will not always develop in the same way, and it points out three different cases:

(25) 1st. Meeting engagement, in which the advance guard has a most important task. The advance guard is given every initiative in order to insure the main body the necessary time and space for complete deployment;

2d. Attack of a defensive position, in which the enemy having given up the initiative, the attacker has indefinite time in which to make his preliminary dispositions; in no case is the infantry to defer its advance only until the artillery has established fire superiority.

It was in this way that the Third German Army (von Hanson) used the whole of 22 August 1914 on the Meuse to prepare its attack of the 23d;

3d. Attack of a fortified position, in which still more elaborate preparatory dispositions should be made, because the enemy may be expected to have made every preparation to inflict heavy losses on the attacker. In this case, the infantry should advance only under the protection of artillery fire, and should gain its position of departure for the assault under cover of night. This procedure, which is carefully described, was to be used against the forts of our eastern frontier; a good example of its use in the operations of the night of 5-6 August, 1914, for the surprise attack on Liege.

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Coming down to the actual tactics of infantry; the Germans, like us, adopted the line of skirmishers as the battle formation; but it appears that they were only regretfully resigned to that formation. The Regulations say: "It will often be necessary to resort to breaking up into small units and the use of open order formations. But it should be considered that the abandonment of close rank formations is an evil which should be avoided whenever possible". In any event, what is certain, is that the German Infantry's adherence to dense formations presented our artillery superb targets in the early part of the war.

But the Infantry does not fight independently, it should operate in unity with the other arms, particularly with the artillery. The Regulations state: "Although the infantry is the principal arm, it always fights in liaison with the other arms". The artillery, which is not to open the battle until (26) the infantry deployment has been made, does not, properly speaking, prepare the attacks of the latter, but, during the progress of the infantry, and while giving as much attention as may be necessary to the hostile artillery, the artillery makes every effort to concentrate its crushing fire effects on that position of the hostile infantry line which is to be assaulted".

As to means of liaison, they are rudimentary; five very simple signals, which have the advantage of being known by everybody and of being capable of execution in the prone position with flags or simply with the arms.

The Regulations add: "The rule is general that the artillery sends forward officers who are to signal back the situation. They should particularly indicate clearly the distance between the enemy and the front line so that the artillery can continue firing as long as possible".

Finally, the Regulations of 1906 also insist upon the importance of the moral forces in war. It says: "Aside from his physical and military instruction, the soldier's value in war is essentially dependent upon his moral and intellectual qualities. The purpose of education is to strengthen them. The soldier's abilities are not used to the best advantage unless they are exercised in conformity to the will of the leader. For this purpose, troops must have discipline for discipline forms the keystone of the army, the prerequisite condition for any success.... Fatigue and privation to which troops are submitted in peace time exercises are of great importance as they are an excellent means of education of the soldier; they temper his will power and increase his self-confidence..... Thus the first condition for success is resolute action".

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The German pre-war doctrine, then, was based, like our own doctrine, upon the offensive; but with this difference that it took fire power into greater account. The Regulations stated: "To attack is to push the fire forward", and further: "the offensive consists in moving the fire towards the enemy; if necessary, to his immediate proximity; the assault with the bayonet confirms the victory". Consequently, every effort is to be strained to obtain fire superiority to shake the enemy's morale (whence the simultaneous engagement of the whole force) and to take shelter from the effects of fire, whenever possible, by the use of fortification.

The High Command, having observed the greatly important part which fire had played in the most recent wars, had drawn lessons, not only for the offensive but also for the defensive, from this fact. During the last few years preceding the war, it had prescribed a more frequent use of field works by the infantry, which had hardly been contemplated by the Regulations of 1906 (1). Much more; since 1911, the infantry was required to participate in numerous fortress maneuvers which were conducted in accordance with the Regulations for Duties of Pioneers in Attack of Fortified Places. In addition, in 1914 the German army was much more familiar with the use of field works than was our own army.

This interest in the importance of fire comes up again the use of cavalry. Between 1900 and 1912, ideas changed and a new evolution oriented that army toward the use of fire action rather than the saber. The eleven cavalry divisions to be available in the mobilization, aside from their battery of horse artillery since October 1913, have a detachment of machine guns and one or two cyclist companies, and since January, 1914, a detachment of pioneers. This cavalry does much of its exploration by means of reconnaissance detachments, but these elements are to be closely backed up by the main bodies of the cavalry, which themselves are supported by mobile units of all arms. Thus it possesses considerable resisting power, not only in preventing the penetration of hostile reconnaissance, but also temporarily to confront important infantry units. The tactics of the German cavalry will then be to avoid saber engagements and to lead the French cavalry into the fire of the rifles and the guns of units in position; in battle it will act principally by fire and, in the pursuit, it will be expended without reclosing.

To sum up: on the French side as well as on the German side, the doctrine of the offensive was in the ascendancy before the war; but in a more reasoned and more methodical manner in Germany than in France.

Effort is to be made to provide every offensive with the following elements of success:

Mass; for we can never be too strong on the day of the battle;

Surprise, the Conduct of Large Units says of this: "whose result for the enemy is a danger which he is in no condition to parry completely or in time". This surprise is to be prepared and enhanced by secrecy of operations, maneuver (generally enveloping particularly with the Germans), and speed in execution;

The combined action of arms on the battlefield so as to get the maximum result by convergence of effort;

The pursuit, vigorous and rapid to exploit the success obtained;

Finally, moral superiority, for "it is the quality of the troops which, in last resort decides the victory", as our Service in the Field puts it.

(1) "The great difficulty which is experienced in getting a skirmish line which is exposed to effective fire, out of cover which it has painfully constructed for itself, and to again get it to go forward, should make us circumspect in the use of the intrenching tool in the offensive" (Regulations of 1906).

CHAPTER II

SUMMER AND FALL, 1914

OPERATIONS IN OPEN WARFARE

I - First Phase

The first phase of the operations, from 2 August to 13 September is characterized by open warfare whose results are immediate though not decisive.

Everything came about as the "Conduct of Large Units" had foreseen when it said: "The general battle is the resultant of army battles which are more or less distinct from one another, but which are all dependent upon a single general conception." Thus, the result which the Germans sought in the battle of the frontiers is obtained by their right wing which threatens to envelop our left; this results in the retreat of the whole French disposition. Reciprocally, a maneuver of the same kind, but this time to our advantage, at the battle of the Marne makes the whole hostile disposition fall back.

The events of this first phase again bring out, from the strategical point of view as well as from the tactical point of view, the importance of certain factors of success. These were already known but it may be well to point them out.

From the strategical point of view, there should be noted:

1st - The importance of surprise. -- A. - On the French side. -- The French command thought that to start with it would have to deal on its front with 20 German army corps and 8 cavalry divisions; as a matter of fact, it had taken into account only the army corps of the active army on a peace footing, thinking that the enemy would not employ his reserves in the first shock. But, contrary to this preconception, the Germans had constituted 14 reserve army corps, thanks to which they were able to mass in their right wing not 8 army corps, as we had expected, but actually 16 army corps. The result was a genuine surprise, which, from the very beginning placed our left wing in a glaring condition of inferiority. (1)

As to the movement of the German right across Belgium, that had certainly been foreseen, since a variant of the plan of concentration (and which was operative from the night of 2 August) had for its object the extension of our left farther to the north. However, the movement was a surprise in that the extent the German turning movement was to assume had not been imagined, and we did not know that that mass was to be made up of the elite of the enemy's armies, and finally that it would launch the offensive before the forces for our extreme left should be completely concentrated (21 August) (2).

(1) However, if we had but wished to consult the German Instructions of 1 January, 1910, on "The Principles of High Command", we would have read therein: "Armies are composed of army corps, cavalry divisions, corps of reserves or divisions of reserves.....", and further on: "The corps of reserves are constituted according to the same principles as are the army corps". In reality, at the mobilization the Germans formed fourteen reserve corps and a certain number of divisions representing in all 31 reserve divisions.

(2) Perhaps too much dependence had been placed on the resisting powers of the Belgian fortresses to give us time to make appropriate dispositions. Furthermore, the English who were to be in position towards Mons on 20 August did not complete their concentration until the 21st. It then was not until the 22d, says Marshall French in his official report, "That he could make his dispositions for sending his troops to positions which he believed most favorable". Finally, it was not until the night of the 22d that the 51st Reserve Division relieved the 1st A.C. on the Meuse south of Namur, and the 4th group of reserve divisions did not reach the Sambre (Joumount) until the 23rd.

B. - On the German side. -- The plan of operation was based on crushing the French before the Russians should have time to intervene; it was known, in fact, that the mobilization of the latter would require a period of two months. That is what deceived the Germans; The Russians were ready as soon as war was declared, this forced the Central Empires to modify their plan beginning with the second week of September, 1914; in any event, from the beginning they had to use their 8th Army against Russia, which army had a strength of four army corps and one cavalry division. First surprise.

(31) Second surprise was England's entry in the war, her immediate intervention had not been considered by Germany; on the contrary, they ridiculed that "despicable little British Army", but they were not long in finding out that they had to take it into account.

Further surprise, when we resumed the offensive on the Marne; our enemies believed that after their early success they had to deal only with armies which had been beaten and which were incapable of reorganization.

Supreme surprise, when the German right, thinking that the moment had come to risk everything, went off on its adventure to the east of Paris to improve its envelopment of our left; and was suddenly attacked in flank by Maunoury's army.

This very incomplete reminder of the first events of the war will suffice to show the considerable part which surprise played in the period of open warfare.

2. The general use of the enveloping maneuver. Its results. -- Faithful to the ideas of their old Chief of Staff, Count Schlieffen, the Germans had prepared to envelop both of our wings from the beginning of operations. Their left wing was halted by the fortifications on the French frontier which, in view of the rapid success over the Belgian fortifications, they had hoped to overcome; on the other hand, thanks to the invasion of Belgium, their right wing was able to execute the contemplated maneuver.

Similarly, the victory of the Marne was due to the use of an identical maneuver by the French command; and as long as the front did not become stabilized, both sides continued to seek the decision by the envelopment.

The effect of this procedure (as in the case of breaking through front) is to destroy the equilibrium of forces; and to avoid impending disaster, the whole disposition is forced to fall back.

(32) Such was the result which was produced by the enveloping maneuver, by the Germans in the battle of the frontier, as well as by the French in the battle of the Marne; but it does not evidently agree with the result which was sought, that is the annihilation of a portion of the hostile forces; the reason is, that in the two battles under discussion, the answer did not reach a full envelopment, but remained at the stage of overlapping of the opposing force. And in effect, as soon as the French commander or the German commander saw the overlapping effect of his opponent develop against him, he avoided the envelopment by another maneuver; that is the maneuver in retreat, which allowed him to escape from the enemy's clutches.

For the envelopment to fully culminate, the armies which are threatened by it must either be ignorant of the danger they are in, or they must be so fully engaged that they cannot free themselves in time; in a word, you must be dealing with an enemy who is completely passive.

At present, these favorable conditions seem to occur very rarely if the commander is well informed and if he knows how to use the characteristics of the armament which facilitates the breaking off of battle and the execution of the maneuver in retreat.

Furthermore, because of the great extension of front which it requires, the envelopment seems to be practicable only when the enveloping army has a marked superiority in numbers over its opponent; an overlapping, on the contrary, does not necessarily imply such necessity for numerical superiority. It is perhaps here that we must look for the reason why enveloping maneuvers in the early operation of the war did not produce the results they were expected to produce.

In August, 1914, the armies which were confronting each other were practically equal; certain German writers (Ludendorff, Freytag, Baumgarten, Crusius, Guedke) even claim that the French, English and Belgians had a numerical superiority of about 700,000 men (1).

(33) In any event, Marshall Joffre, referring to the battle of the Frontiers wrote in his memorandum for the Briey Commission of Inquiry: "It was not superiority in numbers which crushed us; the measures which had been taken allowed us to engage in battle, not only with a sensible numerical equality, with the German forces on the whole, but with the same distribution of forces on the Allied side as on the German side..... But the Allied left, faced by the best units of the German army, included dissimilar units and those which were of unequal value (English army, Belgian, army, etc.)"

The same thing occurred at the Marne, in spite of the fact that these same German writers attribute their defeat to their inferiority in numbers (2)

It is therefore evident that the results obtained by the overlapping of the flank were due more to maneuver and threats than to the importance of numerical superiority. On the contrary, in order to make an effective envelopment, a great superiority in numbers would have been necessary. Furthermore, this is the idea which Freytag expresses when he wrote: "Hostile armies may be individually enveloped, as happened at Tannenberg and later at Herman-Stadt, where the "Cannse" of Schlieffen was consummated, but the envelopment of the entire hostile force is a very difficult undertaking. To accomplish it at the Marne, we would have needed another army disposed in echelon behind the German right wing."

3. The importance of the moral forces. -- The victory of the Marne was not only due as has already been stated, to the ability of the command and staffs, but primarily to the moral force which the troops demonstrated and which had been carefully developed.

After the battle of the Frontiers, our troops fought in retreat; but they did not have the feeling that they had been beaten (which, furthermore, is true), and in addition, the command explained to them that the enemy's maneuver had to be met by another maneuver, a temporary retreat, until such time as a more favorable situation would permit the resumption of the offensive. (3)

(34) And these two considerations were enough to maintain morale during that hard retreat, in spite of the painful impressions caused by abandoning one of the richest parts of France to the hands of the enemy, in spite of the excessive hardships of a march, which for the left wing, amounted to nearly 300 kilometers, and which continued for twelve days in a torrid tem-

(1) In reality the Allies had only 66 French and 4 British divisions since 6 Belgian divisions which did not participate in the battle of the Frontiers should be deducted; or a total of 70 Franco-English divisions, representing a force of 1,100,000 men. As to the Germans they had available 71 active and reserve divisions and 17 brigades of Ersatz troops who entered line in Alsace and Lorraine from the beginning; that is a total force of 1,400,000 men. (2) In fact, from early in the operation, the German army had been weakened by 11 divisions which were used in the sieges of Antwerp and Mauberge or had been hastily sent to the Russian front. It may therefore be admitted that at the battle of the Marne the opponents had practically equal numbers. (3) General orders of the Commander in Chief, dated 2 September, prescribed that "all should be informed of the situation and should extend all their energies for the ultimate victory."

perature interrupted only by the battle of Guise, which was a success for our arms.

The faith in success and the confidence in commanders were such that, when the order to turn about and renew the offensive was received, these troops, physically exhausted, threw themselves into the attack with an ardor and a dash which were the most sublime manifestation of the power of the moral forces. (1)

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The Germans, who at that time said that the French ran from them like rabbits, did not expect such a reversal of energy; they thought we were no longer capable of that "courage and disdain for death", which General Baumgarten-Crusius acknowledged in our soldiers of the Marne; and that was one of the causes of their defeat.

A striking example, and perhaps the most convincing one of the whole campaign, of the influence of the moral forces upon success, and of the care which a commander must give to elevating and maintaining them to the highest point.

4. The lack of coordination in the operations of the Allied armies. -- What was lacking, and what was to remain lacking for a long time in the operations of the French, Belgian and British armies, was the coordination which results from a plan which is agreed upon in common and which is executed under a single direction. Each of these armies had its own leader; there was little established relation between these leaders, and those such as there were, were poorly defined. Also, there was no unity of action in the theater of operations. M. Hanotaux (2) says: "We may now say that the Belgian command, in assuming the action of withdrawing its army into the entrenched camp of Antwerp followed a political and military conception which did not at that time meet the situation. In the same way, the British army did not appear in the region until the 23d, although the battle had been under way for two days and the situation had already been compromised between Namur and Charleroi. The mission as a turning wing, which the English army was to fulfill, was thus unfulfilled at the decisive moment. (2)

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From the tactical point of view the imperfections of our methods were apparent to the French command who at once called attention to them in its notes of 16 and 24 August, 1914.

1. Effect produced by modern arms. -- From the first engagements (and the losses are there to prove it) it is noted that the fire of modern arms is one of the preponderant elements in battle. The Germans complained bitterly of our 75 which ravaged their ranks; our troops, on the contrary, were not so impressed as might have been expected by the fire effect of the German artillery which, during the whole first period, generally fired too high; its 105 and 210 projectiles produced a moral, rather than a physical effect. On the contrary, the range of the heavy artillery, superior to that of our 75, protected it from our fire; and that was an element of

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(1) We recall the message, since famous, of the General in Chief dated 6 September: "When we are about to engage in a battle upon which the fate of the country depends, it is fitting to recall to all that the time has come when we must no longer look to the rear. Every effort must be used in attacking the enemy and in pushing him back. A unit which can no longer move forward must, at all costs, hold the ground which it has captured. And die in place rather than fall back. In the present situation no weakness can be tolerated."

(2) L'Enigme de Chaileroi by M. Hanotaux, September, 1917.

incontestable superiority. (1)

But the arm to which no one remained indifferent was the machine gun, which, by its material and moral effect, reigned as mistress of the battle-field. (2)

(36) On the other hand, from the beginning, the German aviation showed that it was accustomed to work in liaison with its artillery, to which it reported targets to be fired upon. In this we were lacking.

Thus the first point which was established was: The primordial importance of fire, which could not be ignored without suffering the most bloody losses.

2. Lack of coordination in the employment of the artillery and the infantry. -- The infantry had no conception of any necessity for waiting for artillery support, particularly when it was a question of taking fortified position. It thus prematurely exposed itself to hostile fire. There was not sufficient coordination between the action of the infantry and that of the artillery. The note of 16 August said: "The more care that is given to the preparation of attacks, the more terrifying they will be to the enemy and the less costly will they be to our own troops. Furthermore, every time this has been done, and every time the command has understood how to conduct the operation with method and rapidity (keep these two terms in mind), by combining the action of the two arms, immediate success has been produced by the incontestable domination of our artillery and by the irresistible power of our infantry." And the Note of 24 August added: "Lessons of battles which have taken place to date indicate that attacks are not executed by an intimate combination of the infantry and the artillery; every general operation is made up of a number of detailed actions, each of which has for its object the conquest of a number of strong points."

"Every time that a strong point is to be taken, the attack must be prepared by artillery. The infantry should be held back and it should not deliver the assault until it has reached such a distance from the enemy that it is certain that the objective can be reached."

"Every time that an attempt has been made to launch the infantry from too great a distance and before the artillery has made itself felt, the infantry has run into machine gun fire and has suffered losses which could have been avoided."

Second point established: On account of the redoubtable effects of fire, the infantry must not deliver the attack until after a serious artillery preparation.

(37) The idea expressed by the Service of Armies in the Field of 2 December 1913, that is: "The artillery no longer prepares attacks, it supports them" was thus seen to be in contradiction with the necessities of battle. We must turn back to the prescriptions of the Decree of 1895, which assigns to the artillery the task of preparing the infantry attack by riddling with

(1) The 105 and 150 had a range of from 7 to 7.5 kilometers, while our 75 hardly exceeded 4 kilometers.

(2) At the mobilization the French regiments were equipped with 3 sections of machine guns (6 pieces), and the German regiments with a company of machine guns of 3 sections (6 pieces); but from early in 1915 the latter were reinforced by an independent machine gun section of 3 pieces which were taken from fixed fortifications; this brought the number of machine guns in a German infantry regiment to 9. From then on the number did not cease growing, on both sides, until in 1918 it reached the figure of 24 pieces per regiment.

projectiles the objectives which oppose such attack before the infantry goes into action. In eliminating the term "preparation" the decree of 1913 particularly wished to express the reaction against the notion of the artillery duel which was an attempt to gain fire superiority over the hostile artillery, before the infantry should become engaged; but it completely recognized the necessity for the artillery to destroy everything which opposed the advance of the infantry.

In fact, the Report to the Minister states: "The attempt to gain superiority over the hostile artillery is only for the purpose of delivering the maximum effect against the objectives of the infantry attack. It remains evident that no occasion should be neglected to gain that superiority; and, furthermore, it will often occur that the first obstacle to be encountered by the infantry will be the fire which it receives from the hostile artillery As to the preparation of the attack by the artillery, such preparation should not be made independently of infantry action, because artillery fire has only a limited efficacy against a sheltered opponent, and, in order to force such opponent to leave his cover, he must be attacked by infantry."

It is upon this last point, which leaves it to be understood that the artillery preparation and the infantry attack should be simultaneous, that the Decree of 1913 was in error; perhaps the source of the error must be sought in our lack of heavy field artillery which prevented us from reaching a sheltered enemy.

Whatever its cause, and even if light artillery alone be available, every infantry attack should be prepared by the artillery. But this supposes that the latter is acquainted with the immediate difficulties of the situation, perfectly informed of the movements and needs of the infantry; and this is not the case. If the preparation of attacks is conceded to be indispensable, such preparation is not possible unless there be intimate liaison between infantry and artillery, permitting the one to make its needs known, and the latter to satisfy them.

- (38) 3. Lack of depth in infantry attacks and excessive vulnerability of battle formations. -- Another result of the effects of fire is that the infantry must expose to that fire only the minimum of its strength, and that in as little vulnerable a formation as is possible. Consequently it should be echeloned in depth.

The Note of 24 August says on this subject: "The infantry appears to fail to appreciate the necessity of organizing for sustained action. When numerous (1) and dense units are thrown into line initially, they are immediately exposed to a decimating fire of the enemy; their offensive is sharply arrested and they are often left to the mercy of a counterattack. The infantry should conduct its attack by a line of skirmishers with sufficient intervals; the strength of this line must be continually sustained, and its advance must be supported by artillery; the advance should be kept up in this way until such time as the assault may be judiciously made."

Such then was the result of our prewar conception of battle, a conception, as we have seen, which was based somewhat too much on the unrestrained offensive which was bound to overcome every obstacle. Hence, the still too dense attack formations (although by skirmishers), and too much crowding up into the front line. As a result, the disposition did not have sufficient depth to escape at least some of the effects of fire and did not permit reinforcement of the fighting line in order to keep up sustained action over any considerable length of time.

4. Employment of field fortification. -- Starting with first contact with the Germans, and notably in the attacks delivered by our Armies of the Center from the 14th to 20th August in Lorraine (Dieuze, Morhange, Delme,

(1) Note that according to the Regulations for Infantry Maneuvers, the density of the line of skirmishers is about one man per meter.

Chateau-Salins), our troops, not without a certain amount of astonishment, ran into position which had been defensively organized and in which the enemy had understood how to make use of every resource of fortification. (1)

39) Our practice was to occupy the natural strong points of the terrain, which we believed favorable to the defense, by organic infantry units; but we made hardly an organization of them due to the fact that we were so imbued with offensive ideas. As a result, we furnished very visible and very vulnerable targets to the hostile artillery, who was thus informed of the strong, but obvious, sections of our line. On the other hand, the great distance between our strong points (about 1000 meters) allowed the attacker to make them fall by flanking action. From that time, the necessity for camouflaging the occupation of our positions should have been apparent; a result which was not obtained until after three years of effort.

However, the Note of 24 August called attention to the prescriptions of Service in the Field, when it said: "When a strong point has been captured, it must be organized immediately, troops must be intrenched and artillery must be moved up so as to stop any offensive return of the enemy."

Later, at the battle of the Marne, we again were surprised when, on pushing the enemy back, we found certain parts of his front outlined by lines of trenches and dug-in machine gun emplacements, these were examined with curiosity so little were we in the habit of doing the same. (2).

Then, after the battle of the Marne, our pursuit was sharply stopped by positions along the Aisne, which, although they had been hastily organized by the enemy, comprised deep trenches and sometimes considerably dense belts of wire.

The Germans then did not hesitate to resort to the assistance of fortification in order to hold on to terrain and, as we have previously pointed out, to enable them to take from their defensive front the forces required for the new maneuver which they were about to attempt. In any event, it was very evident that their troops had been trained in field fortification.

40) On this point also we had to abandon our prewar ideas and learn to dig. It took some time for this habit to completely penetrate us, as we shall see later.

5. Absence of shock action between the opposing cavalry. -- During all that period our cavalry executed wide circuits, particularly in Belgium, and wore itself out without being able to come to blows with the German cavalry, which systematically refused combat with the saber. Every time contact was made with its patrols, the latter withdrew and drew our squadrons under rifle fire or under fire of the carbines of cavalry units who had dismounted. The same Note of 24 August called attention to several conclusions of merit:

(1) The enemy awaited the French attack in a position which had been carefully studied in time of peace and upon which work had been commenced August 1. It was a general fortified line covering the communications between Metz and Strasbourg and joining those two intrenched camps The German resistance was feeble on the 14th; it strengthened as they approached that line and was particularly tenacious on the 17th. The battle of Marhange-Sarrebourg occurred on the 20th on ground which had been prepared at leisure. (General Mangin, Comment finit la Guerre.)

It was the same in Luxembourg, where our heads of columns ran into very important defensive organizations.

(2) Particularly on the front of the A Reserve Corps, which had a defensive mission in the region northeast of Esternay (Forrest of Gault, Glo le Roi).

It said: "Our cavalry divisions should always have infantry supports to back them up and to increase their offensive power. Time must be allowed for the horses to sleep and eat, when this is neglected, the cavalry is prematurely used up before it has even been employed."

In fact, after the battle of the Marne, our cavalry had not recovered from the fatigues of the early phase of the war, and probably therefore did not render us the full service which was to be expected.

6. Lastly, organization must be such as to insure sustained action. -- "In order to insure ultimate success, it is not enough to have dash and courage; the faculty of sustaining the campaign must also be present; and as a result we must avoid the premature use of units, on the march as well as in battle." (Note of 16 August.) Consequently, every fatigue, which may not be required by the tactical situation, must be avoided; there must be no useless waiting periods or excessively late distributions, which expose exaggerated efforts upon units.

(41) In addition to these remarks touching upon strategy and tactics, the first operations of the campaign brought out two questions of a more general interest which merit attention; the lack of munitions and the initiative of the executants in the period of open warfare.

The lack of munitions was felt very early. -- Although the experience of recent wars had shown that an initial supply of 3,000 rounds per gun was necessary to begin the war, we had hardly half that amount. Also, from the battle of the Marne the lack of artillery ammunition began to be cruelly felt; the situation appeared so grave that the general in chief did not hesitate to take the situation in his own hands; he then became the great distributor of munitions.

It is curious to note that a similar situation was produced on the enemy's side at about the same time; we read in von Freytag: "The supply of artillery ammunition which had been counted upon for war was shown, in the case of all the belligerents, to have been very much below the actual needs. Particularly at the end of the Autumn of 1914, more than once our troops found themselves in critical situations as a result of that insufficient supply. Nevertheless, it would have been impossible to store, in time of peace, such an immense supply as was now actually needed."

(42) The initiative of the executants in the phase of open warfare (1). -- It is apparent that during all that period of extreme activity, leaders of every grade were placed in positions where great initiative was required and at times had to make decisions which were charged with grave consequences. It could not have been otherwise in a constantly changing situation which the higher commanders could not follow closely enough to give appropriate orders. The high commander influenced the battle by means of directives which states his intentions and which often covered a period of several days. Every time that he attempted to intervene by means of orders which contemplated immediate execution, such orders arrived too late and were then not consistent with the actual situation. A degree of initiative on the part of the executant, from the division commander down to the section leader of infantry or artillery is then necessary; and the exercise of this privilege, to which all grades had been accustomed in peace time, rendered us most valuable service.

In modern battle, and particularly when under fire, every leader has constant occasion to use initiative; the superior commander cannot take his place; he must limit himself to first making known to the subordinate his own intentions and setting for him a mission to be accomplished; in that

(1) By executant we mean leaders of all grades from the division commander (inclusive) down to the commander of the smallest unit.

way unity of action and convergence of effort are obtained. The conduct of the battle is practically in the hands of the executants, and no matter what we may do about it, it remains there. Usually, the superior commander no matter how well he may be informed of the situation, can influence the course of the battle only by the use which he makes of his reserves (men or fire).

Conclusion. -- The Notes of 16 and 24 August, so concise and to the point, thus from the very first days of the campaign, corrected the imperfections and filled the breaches in our instruction, not only by calling attention to the prescriptions of regulations but by formulating new one.

The counteracted in particular:

-- against the habit of neglecting the effects of fire by forbidding excessively dense formations in the attempt to secure mass effect, and by providing for the employment of field fortification;

-- against exaggerated rapidity of execution, against that furia francese, which did not allow the establishment of cooperation of effort between infantry and artillery; whence the necessity for blending method and rapidity.

Finally they insisted upon the importance of liaison, particularly between infantry and artillery, a problem which had only been stated and which was to require a long time to solve.

In a word, it put its finger on the sore spots.

But, by means of simple Notes, could deep rooted habits and the general trend of established ideas be instantly modified?

If such were the case there would no longer be any argument for peace (43) time instruction and the results to be expected in war from such instruction. Our army was to require a long time to assimilate these sane and wise prescriptions as to:

The preparation of infantry attacks by artillery fire;
The depth to be given to all infantry attack formations;
The diminution of the density of the line of skirmishers;
The organization of the terrain as fast as the advance was made.

II - Second Phase

The second phase extends from the end of the pursuit after the Marne (13 September) to the end of the race to the sea (16 November).

It is characterized:

By the continuation of the enveloping maneuver, the initiative of the movement passing alternatively from one to the other of the two adversaries; the result of this was a contest for speed, which was to end towards 20 October when the fronts were extended to the North Sea;

By local attacks along the defensive front in order to prevent forces from being taken from them for transportation towards the north (battles along the Aisne and in the region of Saint Mihiel).

The progressive extension to the sea resulted in a simultaneous stretching out of the rest of the front from which units had been taken to make the extension.

Convinced, towards 20 October, that the envelopment of our left was no longer possible, the Germans attempted for a month to break through our new front in order to reach the ports of the coast; but their attacks on Ypres (22 October) and on the Yser (Dixmunde, 13 November) led to no result. Finally, the battle stopped (16 November); the Germans had now suffered the second great check which they were to receive before that of Verdun.

The famous plan for encircling the French armies had completely broken down.

And so, as long as it was possible, that is, as long as there (44) was maneuver space, the plan of both sides contemplated the envelopment of the exposed hostile wing, exactly as in the war of movement, of which that phase was moreover nothing but the continuation. We, therefore, always find in these flanking attacks an attempt to secure surprise, from which the decision is expected; but each time the attack ran up against a similar maneuver of the enemy. More and more equilibrium tended to become established; it is curious to note that in the same period of time, the French and the Germans transported towards the north practically the same quantity of troops, about 36 infantry divisions and 12 cavalry divisions (46)

The German attacks at Ypres and Dixmunde were launched over terrain which was absolutely flat and against a cordon of troops who had no depth; their disposition was like that of attacks in open warfare, that is to say, they presented too great a density against positions which were held, it is true, by very inferior effectives, but which were protected by some elements of trenches. And, in spite of some partial success, they broke down with heavy losses (1). In the same way our attacks against fortified positions along the Aisne broke down; Craonne, Berrn, Nogent-l'Abbesee, Maronvilliers.

Thus we see the early characteristics of attacks against fortified positions; attacks which were too dense, and for which there were not sufficient means to make an adequate preparation, and which were very costly.

Finally, we again in this period, like in the precedent, give credit (45) to the moral value of our troops. No doubt they still were under the comforting influence of the victory of the Marne, but they were also greatly worn out; and they must have been greatly impressed with the mission that had been confided to them in order to continue to demonstrate such ardor, endurance and tenacity. In fact, the situation was serious, the enemy's attacks were continuing; every available unit had to be used, active army, reserves and territorials and the cavalry had to be dismounted. But as soon as these troops reached the scene of action, they felt the impulsion of an energetic command, whose watch-word was: attack or hold at all costs. Nothing more was needed to induce dashing action and heroic traits, among which may be mentioned the action of a regiment of dragoons fighting on foot; then its cartridges were gone, armed only with its lances it threw itself against the rifles of the German infantry and forced them to withdraw. That is what men, who although harassed and worn out, but who are animated by an ardent love of country and who understand what they are fighting for, can do.

Thus, towards the end of October, the front crystallized from the North Sea to Belfort, that is over an extend of about 800 kilometers. Following flanking maneuvers we are to see frontal attacks, the only ones possible from now on; they necessarily have in view the piercing of the fortified hostile front for the purpose of reestablishing war of movement, that is to say, to bring about a decision.

It was that result which the Germans vainly strove to produce from 25 October to 13 November, 1914. It will be our turn now to try our hand at that new art.

(1) It is to be noted that these German attacks were mostly conducted by reserve army corps (XXII, XXIII, XXVI, XXVII) of recent formation, which contained very few elements of the active army, and which were under fire for the first time.

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CHAPTER III

WINTER of 1914-1915 and the YEAR 1915

BEGINNING OF POSITION WARFARE

PERIOD OF GROPING

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This period covers the whole winter of 1914-1915 and the year 1915. It is characterized:

On the one hand, by the generally defensive attitude of the Germans, whose attention is attracted towards the Russian front, and who perhaps were afraid to renew experiences so costly as those of Ypres and Dixmunde; their activity was almost exclusively confined to the Argonne, where they had some success;

On the other hand, by a clear-cut offensive attitude on the part of the Allies (particularly the French) which, in several attempts, endeavored to pierce the enemy's fortified front, and thus forced him to retain a maximum force in France; but they went up against an enemy who was numerically superior and who was better equipped.

What were the opinions held at that time. -- We had started the campaign with the idea that the war would last but a very short time. Four months had now passed and it was brought home to us that it had been impossible for us to win; winter, which is not a suitable season for extensive operations, was upon us; we deferred our hopes to the following spring, not supposing for a moment that our efforts could be in vain and that the war could go on for several years.

What then was our astonishment when we learned, towards the end of 1914, that the English, who were organizing their military bases on our coasts were contracting for land and buildings for a period of three years! Did we not say they were unreasonable? However, everybody knew that the English army existed only in an elementary way and that it would need time to organize from the bottom the new units; and that the Belgian army was in a state of complete re-organization. Would it not have been wise to wait until our allies should be in condition to participate in our offensive with all their forces? That idea never even entered our minds; furthermore, the French army was ready, it was force enough for the task; and, instead of organizing for a prolonged effort, we thought only of finishing the job as quickly as possible; we still had faith in the virtues of the offensive on which we had been brought up.

However, from the end of September on a great part of the front, then from October and November in the region north of the Oise, we found ourselves halted nose to nose with the enemy; we established ourselves in some sort of fashion in the holes we had been forced to dig to escape the effects of fire, and we learned to pass the whole winter that way.

What did we do to meet this situation?

The truth is that we were surprised and somewhat at a loss to know what to do in face of a situation which we had not foreseen, which we had never heard about, and in any event, which we had not been trained for.

In spite of the orders of the command which prescribed the defensive organization of the ground, the result was bungling and hesitation, occasion on the one hand by the instinctive repugnance of the men to digging, and on the other hand by an inability to understand the use of such works in view of the fact that the ground organized at such great labor would soon have to be abandoned to resume the offensive. Also, whenever there was a question of constructing a work of the least importance, even of putting in wire, the assistance of

the engineers was called for, who were naturally too few to meet all the demands made upon them. Briefly, we did not believe that such stabilization would be prolonged, and that idea took all enthusiasm out of the work. Practically the only units which fully profited from well understood fortification, were those which were subjected to hostile attacks.

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The new form of war, Stabilization and the problems which it presented. -- In fact, in spite of us, a new period was beginning, the characteristics of which are very different from those of war of movement.

The attempt at envelopment having become impossible, the enemy worked to build up a front which should be as strong as possible, he was very active in reinforcing his positions, applying to them all the resources of fortification, so that when we shall attack we will have to capture very strongly organized lines.

Thus we were confronted with a new problem, and which required thinking over.

What did we have to guide our ideas? Of Regulations of a very special character, and of which we hardly knew the situation. They were the General Instructions of 30 July, 1909, revised 9 August, 1913, on Siege Warfare, and the Instruction on the Service of Artillery in Siege Warfare of 19 June, 1913.

Now, these regulations taught us that in order to overcome a stronghold which is defended by exterior works, ample and powerful materiel must be used; it was for this reason that the French army had been provided in peace time with three siege trains which contained our heaviest caliber (land) cannons and which had been provided in view of a siege of the German fortresses.

These regulations furthermore taught us that the role of the infantrymen in siege warfare was altogether different from that which he fulfilled in a war of movement, particularly the task of workmen very much like that of engineer sappers, until the day when the assault was to be made.

These regulations informed us that such operations are very slow, that they should be conducted with order and method, and that the role of the artillery, whose fire is prepared and conducted according to scientific methods, is preponderant therein.

These were all the more reasons why we did not favor such methods of warfare.

(49) The infantry is not inclined towards the work of engineer sappers, and the light artillery feels a repugnance towards the adoption of the methods of heavy artillery; did not the artillerymen of before 1914 have a certain disdain for his comrades of the foot battalions? This sentiment had not disappeared.

However, examples of siege should have come to our mind; those of Paris and of Belfort in 1870, that of Plevna in 1877, and, still more recent, that of Port Arthur in 1904. And lastly, had we not, just a few years before the war, conducted maneuvers for the purpose of studying the attack and defense of fortified places (Langres for example, in 1906)?

Yes, but all those to our minds were nothing but examples of very particular cases; the subject might be of interest to certain specialists, heavy artillerymen and sappers, but not to the army in general.

That opinion, very excusable before the war, should have been modified from the end of 1914, when confronted by the new situation, which, although not corresponding exactly to the conditions of siege warfare, at least resembled it in some particulars. To be sure, we would not find a central keep, a defensive redoubt, made up of a fixed geographic locality; and it would be impossible to

deprive the enemy of his interior resources; but the methods to be adopted to reduce the enemy's successive lines of defense were to be on a large scale, nearly the same as those to be used in siege warfare. It seems that if we had been better acquainted with those special methods, particularly, if we had more clearly appreciated the situation, we certainly would have taken less time and would have suffered fewer losses in ultimately adapting ourselves to this situation.

Be that as it may, faced by an intrenched enemy, and in order to escape the effects of fire, which we now commenced to appreciate at its true value, our infantry instinctively went to earth, the individual men on the firing line dug holes for themselves, and sketched out a few trenches. But these rudimentary works could not be called a defensive organization. In reality, the formation in which we found ourselves when we had to stop crystalized in place. The line of skirmishers was hidden after a fashion in bits of trenches which constituted at the same time shelter and obstacle (rudimentary obstacles were made up of a few Brun entanglements); the supports and reserves were sheltered in similar trenches while waiting to be used as reinforcements or in counterattack.

Thus was born the continuous trench; even though no Instruction had prescribed this system of defense, it was applied on the whole front, because it naturally suggested itself as facilitating liaison and observation. From then on there was no more fear of flanking movements as there had been when we occupied strong points. The adoption of the continuous trench was followed by linear organization, which had been so much criticized in time of peace and which, however, was to demonstrate what resistance it was capable of putting up.

Finally, the use of fortification was to revive the old struggle between projectile and cover, in which the defender, continually striving for better protection from the fire and from the enemy's attempts, was to progressively increase the resisting powers of his organization, while the attacker was to extend all his efforts to crush such organization by putting into service materiel of greater and greater number and power.

This presented a second problem for the attack; namely that of artillery materiel.

The calm, which followed the German's unfortunate attempts to break through on the Yser, gave us an opportunity to equip ourselves for that new war, particularly to reinforce our armament. All available artillery materiel, which had greater effect than the 75 or 105 against fortified works, was put into service. This accounts for the appearance, under the name of artillery of position of the calibers 95, 120 (guns and howitzer), 155 (gun and howitzer), the 220 and even 270 which were withdrawn from land and coast fortifications or the siege trains which for the time being could not be used (1). But it must be noted that all these heavy pieces, which were generally of the de Bange type, were slow firers and were moreover few in number. As a result, they were not able in a limited space of time to deliver the necessary quantity of ammunition either to stop an attack or to accomplish the necessary destruction (in case we attacked- TR*). (51) Furthermore, the 75, reinforced by a few batteries of 105's, which, thanks to their rapidity of fire, still for a long time were to bear the brunt of all encounter and were to be used for every task; destruction, counterbattery, antiaircraft defense, accompanying artillery, offensive and defensive barrages. In spite of all the service which it accomplished, we must readily admit that the 75's lack of power and range made it unsuitable for certain missions, such as destruction and counterbattery for example.

It was under such conditions that we were about to start out in position warfare, a form of warfare with which we had so little acquaintance and for which our artillery materiel was potentially unsuitable. But, as we did not believe that the war could last long, we were satisfied with the small means of

(1) Between 300 and 400 pieces, mostly slow firers, except a hundred 155 C.T.R. Rimailhe and a few 105's, which appeared at the end of 1914.

production available to turn out materiel of old types, to increase munition output to make up for our deficiency, to provide the infantry with a greater proportion of machine guns, and to increase our number of airplanes. In fact we had no idea of inaugurating a long term construction program to provide the powerful and rapid fire artillery materiel in which we were lacking. The first construction program for heavy artillery, based on the requirements of position warfare, was not in fact laid down until May, 1916, and that delay of more than a year in the construction of materiel, which from now on was indispensable, was not to be without influence upon the duration of the war.

On the other hand, the paucity of our artillery materiel will place certain limitations upon the development of the offensive, which is subordinated to the execution of destruction. And thus a third problem is presented; how to accomplish the destruction believed to be necessary with such materiel, without destroying the rapidity and continuity of execution, which are indispensable to the success of any attack?

The type of heavy artillery available would not allow simultaneous destruction over the whole depth of the organized positions, although the depth of those positions was very limited.

We will then have to proceed by successive attacks, each attack being separated by delays which the artillery will take advantage of to change objectives and, when necessary, to change position in view of a new preparation. But such method of (52) procedure is going to make the action so slow that the enemy will be allowed all the time he needs to collect himself and to reestablish himself upon his positions.

This was to produce a very rivalry between these two contradictory requirements:

-- the necessity for halts to allow the artillery to make new dispositions in view of a new preparation (necessity for method);

-- necessity for acting with rapidity in order to prevent the enemy from collecting himself; that is the necessity of exploiting success (necessity of rapidity and continuity in execution)

And, until the end of the war, we shall witness a veritable struggle between the partisans of method in execution as well as in preparation, and the partisans of rapidity and continuity in execution; that is to say, between the partisans of successive attacks and those violent, brutal attacks, pushed through without halts.

Finally, the Germans were not to delay seizing the initiative in gas warfare, which introduced a fourth problem: what defensive measures to take against the effects of toxic gas, and how to use them ourselves?

We know how, with the aid of the mask, we progressively secured effective protection of personnel against gas. But as far as the tactical employment of gas was concerned, it took us a long time to realize that the neutralization of personnel (by use of gas- Tr) could supplement the always incomplete destruction of defensive organization.

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The events of that period, as well as the lessons which were drawn from those events, may be grouped under two phases: the first phase includes the local attacks of the winter of 1914-1915; the second phase includes the great allied offensives of Artois (9 May- 18 June) and of Champagne-Artois (25 September).

I - First Phase

(53) 1. Early attacks against a fortified front. -- During the whole winter of 1914-1915 we continued to keep the enemy busy by means of local attacks; as in Champagne (battles of Crony, 8 January; battle of Perthos, 15 February-18 March,) in the Woeyre (Les Eparges, February-April), in the Vosges (Hartmanns-willerkopf, January-May), in Artois (vicinity of Arras), in Flanders (Maison du Passour) and, finally, in Argonne, where we reacted to enemy's attacks by taking Vauquois (4 March).

There took place, therefore, from one end of the front to the other, an uninterrupted succession of battles which were local actions, for the possession of more or less advantageous positions, rather than general actions delivered with a view to large results (except for the battle of Perthos). Still imbued by methods of war of movement, our army sought, by experience which was often costly, the new path to be followed in taking fortified positions. It is to be noted that at this period the enemy still used but a first position, made up of two or three lines of trenches, but which had good shelter and good entanglements.

On the initiative of the Germans, mining warfare made its appearance on different parts of the front, particularly at Les Eparges, in Argonne and in the vicinity of Arras (further resemblance to siege warfare); also on their initiative, and contrary to all international conventions, the use of asphyxiating gases was started to break down the resistance of the defense.

2. First Conception of Offensive Operations. - The Note of 2 January, 1915. The note of the commander in chief dated 2 January, 1915, sums up the first lessons drawn from our attacks against hostile organized position, and gives appropriate indications on the method of conceiving and executing such attacks.

This note, in the first place, states that war against organized positions (54) "has in no way nullified the principles which are the basis of our offensive doctrine"; but because of the power of fire and of the strength of defensive organization, "operations are characterized, both in time and space, by a slower and more methodical development". (1) . The principles remained sound; as to details of procedure in the attack, they required adaptation to the new situation with which we were confronted; and that was the exact truth.

Those details of procedure were destined to be inspired by the following considerations:

a. Necessity for the command to prepare the attacks down to the smallest detail.

b. The success of every attack was subordinated to a very powerful artillery preparation, whose destructive effect was to open the way for the infantry.

c. In the zone selected for the offensive, there were to be as many attacks as might be permitted by the available infantry and artillery strength; these attacks were generally to be made simultaneously, in order to prevent the enemy from concentrating his means at a single point. Each of these attacks was to be made on as large a front as was possible, and were to be extended to the right and left by fire action for the purpose of neutralizing hostile flanking units or works.

d. As the artillery preparation could be put down only on the first lines of trenches and their approaches, the offensive necessarily was to be divided into several successive attacks which were to be renewed "as rapidly as the requirement of complete preparation would permit".

(1) The conclusions which result from a study of our pre-war regulations for siege warfare.

e. As far as the infantry was concerned, it was to make every effort to avoid natural strong-points, such as villages and woods, which could not have been destroyed by our artillery materiel, and was rather to contemplate the capture of trenches in the open; it was to follow the artillery fire as closely as possible, and was to strongly consolidate in the occupied trenches so as to be able to repulse any counterattack.

f. Finally close liaison between infantry and artillery is further recognized, not only during the preparation for attack, but also during the execution and even after it has succeeded.

This concise note (it is contained in two and a half pages) on such a complex subject, was naturally very incomplete, nothing was prescribed therein for example, on the subject of secrecy of preparation, of efforts for surprise, of the offensive use of terrain. Very little mention was made of the dispositions to be taken up by the infantry in the attack; the first lines should be strong enough to assure the possession of the trenches which have been taken; and should be followed as closely as possible by reinforcements so that the enemy's barrage might not prevent the reserves from supporting the attacking line. We do not find in this note the recurrence of the idea, which, however, had been expressed in the Note of 26 August, 1914, and which we had far from put into practice, of the lessening of the density of attack formations and of the echelonments in depth of infantry dispositions.

On the contrary, the note of 2 January, taking into account the power of fire, the strength of defensive organization and also our precarious means in artillery, sought in a national way to find a solution to the new problem which confronted us. The High Command fully realized that it did not possess the necessary materiel to prepare an attack over the full depth of organized positions (and we know that at that time the enemy had organized only a first position), and that the infantry could not take fortified lines upon which the artillery had not placed its destructive fire. It, therefore, did not hesitate to proceed by successive attacks, each of which should have for its object, the capture of the line or lines of trenches whose attack could be prepared by artillery; great credit must be given to it for having understood how to proportion the end to be accomplished to the existing means. The attacks were to be prepared by halts, which were to correspond to the duration of the preparation upon the next line of trenches. Now, since the lines of trenches of a single position were only some hundreds of meters apart, and since our batteries consequently would not be forced to change position in order to put down (56) a new preparation; it would seem that the duration of these halts should have been very short, if we had had even a reduced amount of materiel, but one of the rapid fire type; unluckily such was not the case; and, furthermore, our methods of adjustment which were designed to secure precision fire, required a great deal of time. For all these reasons, the halts between successive positions were necessarily quite long.

Thus the limitations of our artillery materiel, as to number, power and rapidity of fire, entailed the following consequences:

a. Lack of depth in artillery preparation (small number and lack of power of our heavy artillery), which required successive attacks;

b. Artillery preparations which extended over several days (necessity for accurate adjustments, slow firing materiel), which destroyed secrecy of preparation and diminished the effect of surprise;

c. Halts between successive attacks which were too long to permit exploitation of the first effect of surprise and to insure rapidity and continuity of effort.

It was under these conditions that we undertook the first offensive which was intended to break the hostile front; battle of Perthes (15 February- 18 March, 1915), which is also called the first battle of Champagne. Its primary object was to force the enemy to leave the greatest possible number of units in our front, and thus to prevent him from transporting them towards Russia.

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The necessity for a large force of artillery, considering the relatively small number of heavy batteries available (about 100 guns), limited the front of attack to an extent of only 7 kilometers, which was later reduced to 3 kilometers. In spite of the narrowness of this front, the attack penetrated from 2 to 3 kilometers into the enemy's position and was about to succeed, if we are to believe a German study dated 14 April, 1915, which stated: "From 16 to 19 February, when the French attacked with two corps in the front line and during which their artillery expended an enormous amount of ammunition, the danger of a break through was great. Only persistence in continuing the infantry attacks was lacking. If the two corps referred to had succeeded in penetrating to the heights north of Tahure-Ripont, the other three corps massed in rear could have enlarged the breach to an incalculable extent, for we at that time no longer had the slightest reserve". Unluckily, it was on the 19 February that it was decided to confide the continuation of the attack to the three corps in reserve, which entailed a halt of several days; furthermore, the enemy's situation then was changed by the arrival of the 1st Division of the Guard on 20 February. Nevertheless, we had conquered a group of remarkably well organized positions and had made 2,000 prisoners.

Nevertheless, such a shallow penetration was immediately seen to be inadequate; as it did not include the general hostile artillery locations, the pocket thus created was exposed to the concentration of fires of that artillery to such an extent that the infantry could hold the positions which it had taken only at the price of the heaviest losses. Thus there appeared the danger of creating, by an offensive which was not completely successful, a salient of slight dimensions inside the enemy's positions; from then on, it was essential to effect a breach as broad as possible and to take to the minimum objective the capture, at one blow of the whole depth of the positions occupied by the enemy, including his artillery positions.

The causes of failure in the battle of Perthes were, therefore:

a. The narrowness of the front of attack, which allowed the enemy to concentrate before that front all the means which he had available;

b. Lack of rapidity in the succession of attacks, which gave the enemy time to bring up reinforcements and to organize new lines of resistance;

c. The invulnerability of the hostile artillery, which not having been taken care of either by the preparation or by the infantry attacks, remained in full control of its fires, and concentrate them at will upon the latter.

It was in this period that the first English attack of any importance was delivered. Its object was not to break the hostile front, but simply to penetrate into it by means of a powerful and rapid action. This was the attack on Neuve-Chapelle of 10 March, 1915.

(58) This operation is interesting because our allies used a very simple method, but which by reason of its very simplicity could only be used once. Having noted the tendency of the first attack line to stop in the first hostile trench which it encountered (for fear of not being followed), and also allowing for the dislocation of the attack formation which the passage of numerous obstacles caused, the English proposed to push into the enemy's lines an attack disposition which corresponded to the defensive organization to be captured. Was the latter made up of three lines of trenches? The disposition for attack would be made up of three successive waves: the first charged with the occupation of the third line of hostile trenches, the second wave the second line, the third wave the first line. Consequently arrangement on the ground in preparation for the attack could be made to correspond to the assault waves which were to occupy it and such arrangement could be made to nearly exactly correspond to the hostile organization opposed to it.

This procedure, which gave fairly good results at Neuve-Chapelle, could not be repeated; furthermore, that is the only time, to our knowledge, that it was used.

On their side, the Germans noted the difficulty of destroying and of taking substantial defenses (although they had available heavy, rapid fire artillery), thought of paralyzing the defense by procedure which was contrary, it is true, to all the laws of war, but which would permit them to gain extensive results; the use of clouds of deleterious gases. Thanks to that process, on 22 April, 1915, north of Ypres, between Steenstraete and Ghelwaelt, they penetrated into the interior of the Franco-English lines to a depth of several kilometers; but, surprised themselves by their easy success, they did not know how to exploit it. In any event, that first lesson in gas was not to be lost and authorized us from then on to make use of the same process.

(59) 3. New conception of offensive operations. Instruction of 16 April, 1915.- The battle of Perthes brought out the difficulties in the attack methods which were laid down by the Note of 2 January, 1915; and the commander-in-chief was not long in publishing a new document, which was much more complete, and which gave an entirely different solution, than did the preceding Note, to the problem of the offensive against fortified positions. This was the Instruction of 16 April, 1915, on "the object and the conditions of combined general offensive."

The enemy, at this period, still having but a single first organized position, we thought we could break it down at one blow (1)., in spite of the fact that our means in artillery had been only slightly augmented since the battle of Perthes.

The desire was to get through with this trench warfare at any price, and to resume war of movement for the purpose of gaining a decision.

Also, the object of the offensive was not to be to successively take possession of the hostile lines of trenches, but "actually to eject the enemy from his complete defensive system and to defeat him, without giving him time to collect himself."

Whence the notion of rapidity and continuity of attacks, which suppresses all intermediate halts, in order to prevent the enemy from "preparing his counterattacks or to reestablish himself in rear. The executants, of all grades, will therefore be imbued with the idea of piercing, of getting beyond the first trenches which may be conquered and of pushing the attack without interruption, without respite, day and night, to a final conclusion".

To accomplish this the artillery was to open the way for the infantry by systematic fires on the whole position, then accompany the infantry by barrages. It was to execute these diverse missions (including counterbattery) by taking positions well forward and by executing certain foreseen displacements during the attack (part of the 75's and even some batteries of heavy artillery).

(60) Preparatory adjustments had to be very accurate, this required the cooperation of aviation or balloons, whose importance was beginning to be appreciated. It is this time for adjustment which was to require the most time, several days in any case; the inauguration of the artillery preparation was to depend upon the results obtained in these adjustments.

On the other hand, that preparation was to be very short; three or four hours for the heavy artillery; as for the light artillery, its fires were to be interrupted to allow their effects to be verified, "the preparation not to be stopped until the necessary results should have been obtained." (2) Trench artillery, still in a formative period, has its role in the preparation (it was used for the first time 9 May, 1915).

(1) In his remarkable study of the attack in this period of the war (Impressions and reflections of a company commander), Captain Laffargus is very much of this opinion when he writes: "The character of this attack is that it is not progressive. We cannot nibble away, piece by piece, the whole series of redoubtable defenses; they must be gobbled in at one blow; with one resolute stroke".

(2) This was why it was to be impossible to fix in advance the exact time the attack was to begin.

The infantry attack is to be preceded by a bombardment by all guns; this to be of short duration, about ten minutes.

During the execution of the attack boxes in the infantry in front and on its flanks by barrages and "takes up on the second and third lines of trenches the role of preparation and of accompaniment which it filled on the first". It is only during this period that the mission of counterbattery, 75's or heavy artillery, is contemplated.

As for the infantry, its objectives were to be points selected well beyond the hostile fortified position, "whose possession would insure the first result to be obtained; pierce the hostile lines". In order to sustain that powerful and uninterrupted effort, the attack divisions were to be engaged on a narrow front (1000 to 1800 meters) and considerably disposed in depth, which would allow them to sustain the action for several days. The assault formation was to consist of successive waves, deployed as skirmishers, to the absolute exclusion of small columns, which were considered to be too vulnerable. "The first wave will have the maximum density which is consistent with the efficient employment of arms, one man per meter".

Finally, attention was called:

To the necessity for organizing and minutely preparing every detail of the operation;

To the duty of the commander of insuring secrecy of operations by every possible precaution, and to conduct the attack so as to secure the advantage of surprise;

To the importance of liaison, principally between infantry and artillery;

To the preparatory work to be done on the terrain from which an attack was to be made.

The instruction of 16 April was infinitely more in detail and more specific than was the Note of 2 January (23 pages as compared with 3); it inaugurated a new conception of operations, which was very applicable as long as the enemy should have but a single organized position to oppose to us; it is true that every effort should be made to break such obstacles of limited depth at a single blow, provided material means of sufficient power be available to annihilate them. But, that was exactly the weak point of the new system; we still did not have the amount of materiel necessary to smash up the successive obstacles of even a single position, simultaneously and over a wide front. The result was to be, either the fronts of attack could not be extended on account of the lack of the necessary means in artillery; or that the artillery preparation would be insufficient, if the fronts of attack were greater than the limit allowed by the materiel available.

And here we put our finger on that new obligation, of which we have already spoken and which is imposed by position warfare; that is to consider, in the conception and in the execution of operations of this factor of materiel; indeed, it was to assume constantly increasing importance, in proportion to the reinforcement of defensive organization and to the greater and greater impotence of the infantry to surmount these obstacles. In short, it is a function of command to establish the exact relation between the results to be obtained and the means which the commander has available; this is just as true, or even more so, in position warfare as in open warfare, as the ability of the combatant can produce all its effect only after the materiel obstacles which oppose his action have been destroyed. For these materiel obstacles, which are of little importance in war of movement, become more and more numerous and resistant in position warfare, in proportion as stabilization is prolonged. As a result then, the work of destruction by the artillery was to assume constantly increasing importance, and already it could be foreseen that the more time he was allowed to reinforce his organization, the more difficult it would become to dislodge the enemy from his positions.

That consideration, as well as many others of greater importance and which required were imperative, led the command to rush events, without waiting until it should however, be in possession of a more numerous and more powerful materiel, which, further- supply; more, had still not been contemplated. From that time on (and we have already tholess, noted that) the gravity of the pre-war errors, or lack of foresight, in the mattit. of the utility of heavy artillery was understood; as well as the difficulties which our infantry, on whom were imposed the harshest sacrifice, was to encounte Als because of this fact. out.

From this Instruction of 16 April, two points still deserve our attention; the struggle against the hostile artillery and the attack formation which was before t indicated for the infantry.

We have seen that one of the lessons of the battle of Perthes was the On 1915. B necessity for exercising control over the hostile artillery in order to prevent decided. it from concentrating its fires upon the attacking infantry. To accomplish this, organiza the Instruction contemplated, not only that the enemy's battery positions should of all k be included in the objectives which were assigned to the infantry, but also that find in our artillery should, at all costs, "counterbattery and silence the hostile bat- thick be teries, whose positions should have been previously discovered, or whose posi- trenches tions should be searched for by every possible means as the battle proceeded." But this mission of counterbattery, which, however, was considered " as one of the first obligations of our artillery", was contemplated for only the actual execution of the attack; during the preparation, the hostile artillery was there- had soon fore to remain in undisputed control of its fire. during t position by commu

The restrictions of these prescriptions may be charged, on the one hand to the lack of artillery materiel which did not allow the simultaneous destruction, during the preparation of both the material obstacles and the hostile artillery; and, on the other hand, to the prejudice, which still persisted, that the battle should not be preceded by an artillery duel, and that the batteries should be (63) devoted to their true mission which was to support the infantry attack. Ex- But remained perience, however, had just demonstrated that these two roles were equally useful. Regulasi great st and that every infantry attack should not only be supported by artillery, but of attac national should be prepared for it. Now, such preparation consists in the destruction or back; an of their neutralization of the obstacles which oppose the advance of the infantry; one of these obstacles is the hostile artillery. If then, that artillery be neglected during the preparation, we will run the risk of being powerless against it during The from the the actual execution of the attack; in any event, during the attack we can only of new w hope to neutralize the hostile artillery, but not to destroy it, no matter how slightly it may be protected by cover.

As to the attack formation of the infantry, it does not seem that it con- sidered sufficiently the importance of fire, whose effects by now had been recognized as deadly. It is true, the Instruction condemned formations in small the Fren columns as being too vulnerable; it spread units over great depth and engaged the been sur only on narrow front, but it is surprising to note that the skirmish line is persuaded persuade still kept at the same density, that laid down by the Regulations for Infantry numerous finally Maneuvers of 20 April, 1914, that is, one man per meter. The experience ob- German a tained since the beginning of the war should have led to a decrease of that been so had been density. commissi of it a

Finally, we do not find in the Instruction of 16 April, which refers to the rupture of the front, any indication of the procedure to be taken once the breach has been opened, which lets it to be understood that from that time on the pro- cedure of war of movement with which we were already acquainted, would be taken up purely and simply. For tions of

4. Progress made in defensive organization during the winter of 1914-1915.

Little by little, experience led to a substitution of disposition in depth for our early linear disposition; the supports and reserves themselves had not been slow in digging lines of trenches on a level with their shelters so they could (64) stop by fire an enemy who might have captured the first line. On the other hand, the trenches had been improved; they had been deepened, provided with firing steps and traverses; the accessory defenses had been reinforced; finally, in active sectors, the value of continuous lines had soon been recognized. But it The upon thi these co and some the first the two obstacle

and which it should further- already in the matter of difficulties encountered. Also, in anticipation of a break through, a second position was sketched out.

That organization had been to a great extent completed on the Artois front before the beginning of the offensive of 9 May.

On their side, the Germans had not wasted time during that winter of 1914-1915. Better prepared than we for undertaking field fortification, and fully decided on defense rather than on attack, they did not stop reinforcing their organization (wire, trenches, shelters, communication trenches, communications of all kinds). And so, what was the astonishment of our troops, on 9 May, to find in front of them, defenses whose resistance exceeded every expectation; very thick belts of wire, concrete shelters, flanking casemated, buried communication trenches, etc.

After having simply applied the pre-war regulations, which prescribed a single trench covered by security elements, the German troops, as ours had done, had soon felt the need of sheltering their supports and reserves. Furthermore, during that winter of 1914-1915, the single trench had been replaced by a position, that is to say a network of trenches and shelters, bound together by communication trenches and protected by accessory defenses.

But, although the defensive organization had grown, the defensive doctrine remained the same as during peace time; "The battle was conducted, as the Regulations stated, in and for the first trench". Thus the German command laid great stress on the maintenance of terrain; first because they knew that means of attack were limited and did not fear a break through; second because of national pride, so that it could not be said that the German army had fallen back; and finally because they feared that a withdrawal might shake the morale of their troops.

The enemy still had not had time seriously to organize a second position; from the first months of 1915, however, we commenced to discover the outlines of new works in rear of his fortified lines.

II. Second Phase.

1. The Artois offensive (9 May- 18 June, 1915). -- On the eve of 9 May, the French troops were in a superb state of morale, which, we may say had not been surpassed at any time during the war. From top to bottom, all grades were persuaded that the offensive was to be crowned with success. The arrival of numerous troops, the appearance of unexpected quantities of artillery materiel, finally intelligence which was circulated on the material situation of the German army still further augmented faith in victory. The infantry which had been so tired during the first months of the war, had bound up its wounds; it had been brought up to strength by replacements, and its officers and non-commissioned officers, who had been reconstituted by excellent material, made of it a weapon of the highest order.

For everybody, the spring offensive was to revenge the fatigues and privations of the long winter which had been spent in the water and mud of the trenches.

The front of attack selected north of Arras measured about 15 kilometers; upon this front 5 corps were engaged. Exclusive of the organic artillery of those corps, the army had at its disposal about 400 pieces of heavy artillery and some batteries of caliber 58 trench artillery, which were here used for the first time in an attack; the largest calibers (220 and 270) were assigned to the two center corps (33d and 20th Corps), in whose front were the heaviest obstacles.

The artillery preparation, which had been interfered with by bad weather, started with adjustment and some destruction during the day (66) preceding the attack; in reality it was conducted on 9 May, between 6 and 10 AM, with the best conditions of weather; it therefore lasted only four hours (1).

Result: it was adequate only on the front of the center corps, whose infantry made a deep penetration into the hostile position; less than one hour after the opening of the attack, its first elements reached the crest of Vimy, 4 kilometers from the trenches of departure. Unhappily, on the right, on the front of two corps (17th and 10th Corps), the infantry only barely got a foothold in the enemy's first line, which had been insufficiently demolished by the artillery. In addition the rapid and early success could not be exploited by the reserves; the breach was too narrow, and as it had not been enlarged, it was quickly closed as soon as the enemy's first reinforcements entered into line.

The advance made by our center, was therefore, limited; nevertheless, it netted us 7500 prisoners and 24 guns.

On the other hand, and contrary to what had been expected, the attack ran up against a very vigilant opponent, and one who too had a very high morale, and who was particularly confident in the strength of his organization (2); on the following days, in spite of his tenacious resistance we still gained some local advantages, but the hostile heavy artillery had been so heavily reinforced that our attempts broke down under the fire of the 210's, which were numerous enough to lay down real barrages (3).

Thus the equilibrium, which for armament had been broken in our favor, was gradually reestablished. However, under the impulsion of an eminently tenacious command, the offensive was resumed on 18 June, but our means of action had hardly been reinforced, the enemy was in strength and was vigilant, any surprise was impossible. This new attack gained only partial successes, which, moreover, were very dearly bought.

(67) Nevertheless, this offensive of two months held 16 German divisions on our front.

(1) In accordance with the prescriptions of the Instruction of 16 April, 1915.

(2) On the eve of our attack, the German army had on the west front, except for cavalry, a strength about equal to that of 20 August, 1914.

(3) The Germans had an artillery reserve at the disposition of the High Command; this reserve in 1914 was made up of 1400 guns, among which was a notable proportion of heavy rapid fire guns which could readily execute barrage fire; on the other hand, our slow firing heavy artillery materiel could be used only to reinforce the 75 barrages with a number of heavy caliber projectiles.

2. Lessons of the offensive. -- a. The Artois offensive showed that the rupture of a solidly organized front which consisted of a single position of resistance, was perfectly feasible, provided there be available the necessary heavy artillery materiel; we had the example of our center corps to prove this; thanks to the 220's and 270's, these two corps reduced very strong organizations (like that of Targette for example) to bits. A Note of General Headquarters, dated 8 July, 1915, says: "The attempts made both by us and by the Germans show that by applying the necessary means in heavy artillery, the rupture of the enemy's lines will be certain."

"The defensive organizations are torn up; the only elements which sometimes resist are well placed casemates and cave shelters, which the Germans generally use".

And nevertheless, the attack of 9 May had been foreseen by the enemy; it took place on a single front and its extent was still too limited; finally, the materiel at its disposal was insufficient to entirely tear up the obstacles to be taken, so that "when the assault was made the machine guns, which had been sheltered in cellars during the bombardment, again appeared". If these unfavorable factors could be eliminated in the future, there was no doubt that complete success would be obtained. The Commander-in-Chief clearly indicated this to the Minister of War, to whom he wrote on 23 August: "With the power of the artillery means at our disposal, the rupture of the front impossible, provided attacks are executed simultaneously and over a broad front (1)".

But our methods also had to be perfected.

(68) b. The infantry elements, which penetrated farthest into the enemy's position, did not receive timely support; furthermore, they were either destroyed or captured. This was because our reserves were too far away. It is true, the Instruction of 16 April, 1915 prescribed that each attack division should push the elements of its disposition forward as closely as possible in order to avoid having its reserves cut off from the first assault waves by hostile barrage fire. In this connection, it was considered that one brigade "would probably meet the requirements of the first day"; but, as soon as the attack succeeds, these troops are quickly absorbed by incidents of the battle (mopping up and occupation of conquered trenches, opening out to the right and left, guarding prisoners, etc.). As for the 2d Brigade, it was to be left "at rest in its cantonments, ready to be alerted to move to the front in a few hours to shelters near the front". If this disposition had the advantage of insuring the echelonment of the division in depth, it had the disadvantage of holding the reserves too far from the battlefield.

For, experience had just shown that "the hour of success is fugitive, and opportunity is lost if the reserves are not opportunely employed" (2).

The Amendment (3) of 26 May, 1915, to the instruction of 16 April, prescribes, therefore, that the 2d Brigade be placed at the entrance to the communication trenches "in shelters or in bivouacs, ready to move forward through the communication trenches or across country, immediately in rear of the first brigade".

(1) For this question of front of attack is bound up, as we know, with that of the number of heavy artillery pieces available; that is why, on 9 May, we could attack only on a front of 15 kilometers and only with 15 infantry divisions.

(2) Note of 20 May, 1915.

(3) Le Rectificatif.

The same prescriptions are again renewed and affirmed in an Amendment dated 10 June, which was thus expressed: "By reason of the nature of actions necessary to take a fortified position, the infantry should be so organized so that it can make a succession of extremely violent efforts within a very short period of time. Large units will therefore be engaged on relatively narrow fronts and will be connected in depth in a "disposition which permits the attack echelons to follow each other at short distance".

c. The General Commanding the Group of Armies of the Center, in a Note dated 29 August, also stated: "the whole front must be attacked with a determined will to take the hostile line at all points by a real assault. No part of the front should be considered as being the object of a simple demonstration, or as (69) having to fall because of the simple fact of the expected advance, and without having a determined attack made against it."

The experience of the offensive of 9 May was conclusive in this respect, particularly on the front of the 21st Corps, on the left, which could not, by simple movement, take the villages of Carency, Souchez, Ablain-Saint-Nazaire.

It is therefore not enough to mask the strong points; their defenders will not be deceived by our demonstrations by fire, no matter how violent such demonstrations may be; the defender of such strong points will retain all his liberty of action to take in flank the real attacks which are delivered against the strong point.

and so the attack was to be made along the whole front, but the command was to regulate the density of the assaulting troops, according to the probable ease of advance of different sections of such front.

d. The Amendment of 26 May, previously mentioned, insists that surprise must be assured; surprise was not obtained on 9 May, and it was not to be obtained on 18 June. The Amendment, therefore, provided for a method which was expected to deceive the enemy as to the real time of attack, and to inflict losses on him in case he was deceived by the trap. The bombardment of all guns preceding the attack was to be made up of several distinct periods of fire, each of which was to be separated by periods of silence, the end of each of which was to be marked by an increase in the range, so as to lead the enemy to believe that attack was about to be delivered. "It is essential to keep the enemy in a state of uncertainty as to the real time of the attack, so that he may prematurely man his trenches and thus expose himself to later bursts of fire".

e. The possibility of a break through apparently having been demonstrated, it was important to take early and preliminary measures for the exploitation of success. The Instruction of 16 April, being silent in this respect, the Commander-in-Chief amended that Instruction by the Annex of 18 June, 1915, particularly relative to the action of the cavalry, and which is thus expressed:

"After a penetration has been executed, if our infantry stops, this is not so much because its offensive powers have been exhausted, but because it has not been able to push the exploitation of initial success far enough and fast enough. Hence, the arm adapted to rapid exploitation is the cavalry; its employment should be provided for and studied on the attacking front. (70)

"Once the German front line organization has been gotten through, the terrain in rear is practically free; the strong points and trenches which are encountered in that area are without garrisons. Cavalry which audaciously follows the infantry across the trenches will be on the enemy's rear just as in open warfare after a successful movement.

"Cavalry must therefore, not be held far from the attacking front, but on the contrary, should be held as close to it as possible.

"It must be close enough for immediate intervention. The corps cavalry of the corps which are engaged will have the honor of passing through first".

There then followed the proscriptions relative to the preparation of cavalry units for the tanks in view.

Acting in small detachments, and in a way, in close liaison with the infantry, the corps cavalry was to be able to give immediate aide to the latter and would facilitate the widening of the pass.

The Annex adds: "It does not seem appropriate to use the cavalry divisions in mass; speed and surprise, the characteristics of small units, will be the best guarantee of success. The results of the actions of many bodies of cavalry, thus used, should be very great; but to gain these results the cavalry must have the will to use every point of rupture regardless of extent or facilities of access to it. It is an idle dream to think of waiting for a breach of 30 kilometers; such action will cause a failure to use the cavalry at all. This is a case for will power, daring and risk".

Such use of the cavalry, though difficult and daring, was not without logic, when we consider the particular conditions present in the battles towards the middle of 1915, furthermore, it was in accord with the offensive spirit of our cavalymen. From the time when the break through was considered possible (and it really was possible so long as the enemy opposed only a single organized position to us), there was no reason why the cavalry should not pass through, first by small fractions and afterwards by stronger units. If it later turned out that circumstances did not permit the cavalry to fulfill this particular role, it must not be concluded that the command was on the wrong track and had nourished hopes which were already out of harmony with the realities of position warfare. Rather, the reason should be sought, as we shall see later on, in the fact that the possibility of a break through, other conditions being equal, became proportionally contingent as the enemy multiplied his defensive positions in depth; that is as he provided means for reestablishing the most compromised situations by the use of few men and in a very short time.

f. It was equally evident that the factor "Time" played a considerable part in attack and particularly in the exploitation of surprise. Also, a new Amendment of 10 July to the Instruction of 16 April calls attention to "the violent and rapid character which must be given to attacks against strongly organized positions The sole purpose of the Note of 16 April was the rupture of the hostile organized line; as soon as that had been obtained, the combat procedures were to become those of open warfare Success was not to be expected along the whole line at the same time; against certain points maneuver would have to be executed, for which advance arrangements even should be made.

"Only the second line troops will be able to accomplish them; the rapidity of their execution will be an important factor of success."

g. Finally there appeared in the same Amendment, the perfectly correct idea that the true guarantee of success consists in getting a physical grip on the enemy's batteries.

"The attacking line should reach the hostile batteries with its first impetus, such artillery constitutes the principal obstacle to the infantry progress once the latter has gotten past the enemy's trenches".

The rupture of the front will result the more surely as we succeed in dislocating the hostile artillery system, upon which the power and length of resistance is to a great extent dependent.

h. As a consequence of the part played by the hostile artillery in the attacks following that of 9 May (18 June particularly), we must mention the necessity, which now began to appear, of destroying that artillery well before the attack, then during the preparation itself, finally of neutralizing it in case its destruction has not been accomplished. Thus, as a result of experience,

the nation of the artillery duel, both before and during the attack, reappeared. It is true this idea appeared under different conditions from those of open warfare, but the imperious necessity for such action was none the less demonstrated.

Thanks to the development of air service, which had now permitted the assignment of a squadron and a balloon to each corps, as well as to the progress which had been made in liaison between those agents and the artillery (1), the demolition of hostile batteries could now be undertaken with some chances of success.

The Note of 25 July said: "The enemy particularly depends on his artillery to stop our attacks; it is therefore indispensable that it be counter-battered."

Every adjustment on a hostile battery should be immediately followed by fire for effect; and, if possible, by fire for destruction. From then on counterbattery was to become one of the most important missions of the artillery; a mission which was to increase in scope with the increase in number and power of the materiel put into service. It was to become an interminable struggle; and was not to be confined, as stated by the Instruction of 16 April, 1915, to the period covered by the execution of the attack.

3. Lessons of the defensive. -- a. The French side. -- Until towards the middle of 1915, the French command scarcely fearing any hostile major offensive, was absorbed, as we have just seen, with the method to be adopted to break through the hostile front, in which it had faith, and by which it hoped to impose its will on the enemy.

(73) However, it was not lacking in interest for the defense of our positions; but none of the numerous notes which had appeared on the subject, since the month of October, 1914, treated the question in its entirety (2).

Since the beginning of trench warfare the mission everywhere imposed on the defense was the same: "Not to lose an inch of terrain".

That preoccupation was pushed to such an extreme, that in certain localities, where we were in immediate contact with the enemy, we preferred to submit to the resultant usure rather than to withdraw our lines a few hundred meters; furthermore, every leader who was attacked by the enemy considered it a point of honor not to lose the most insignificant trench element.

The result of that conception was as follows: to be very sure not to lose the part of the line confided to him, and for fear that reinforcements would not arrive in time, the commander of every infantry unit was led to cause his first trench to be permanently and very strongly occupied. Such great infantry density of the first line had the serious disadvantage of causing useless losses in normal times, and the destruction or capture of the defender, in case of attack; in addition, the available units in rear, reduced as a consequence of this disposition, were too weak in number to effectively oppose the progress of the assailant, who was thus easily able to seize a certain depth of terrain.

(1) The Instruction of 2 May, 1915, on the employment of aerial observation in liaison with artillery, was replaced by an Instruction of 12 August which was much more developed, and which again called attention to "the capital part of the counterbatteries during attacks".

(2) In January, 1915, a pamphlet, entitled Field Fortifications in accordance with the early lessons of the war, gives some details of organization; but it does not contain any general principles confirming or denying those of before the war.

A realization of the effects of both the German and the French artillery preparations, particularly following the Artois attacks, centered the attention of the command upon the dangers of that situation.

In its Note of 8 July, 1915, the command stated that by bringing to bear the necessary means in heavy artillery the tearing up of the defensive organizations and the rupture of the enemy's line were bound to be effected. It adds: "It is therefore no longer appropriate to put all the effectives in line on a front believed to be inviolable, but to hold a large proportion of them for maneuver. For an army which is in a defensive situation, the battle has only begun when the enemy has passed the first line. The army commander should have the necessary resources in artillery and in infantry at hand to continue the battle. He should have foreseen this action as a consequence of the violent and continuous bombardment whose purpose is to tear up the line, and which begins one or several days before the attack. But the counterattack should be immediate for sector reserves, and very prompt for army reserves; otherwise, the enemy becomes installed upon the position which he has conquered, and it is then necessary to organize a deliberate attack, like any other attack, to get him out". Consequently, the following were strictly required:

- (1) To diminish the density of occupation of front lines, whose defense was to be confided to small groups and to carefully placed machine guns;
- (2) To place reserves so that they could be easily moved;
- (3) To be able to reinforce rapidly the artillery on any front attacked.

The early linear organization then gave way to be the beginnings of organization of the defense in depth. The first line of continuous trenches was to be paralleled by a line 1 sub (1) or support line, about 200 kilometers in rear; according as this line generally escaped the effects of the artillery preparation, so would counterattacks delivered from this line stand a better chance of success.

Such were the new principles which resulted from eight months of trench warfare, and which were to serve as a guide in defensive operations. We cannot fail to recognize therein the great insight of the command; during the three years of stabilization which followed, we were able to supplement them and follow up their application by prescriptions of all kinds, but we did not have to change them in any respect. Therefore, it would have been very desirable if there had been immediate conformity, in all grades, to these principles. Unhappily, this Note of 8 July, 1915 on the defensive had the same fate as the Notes of 16 and 24 August on the defensive, so difficult is it to modify suddenly established mentality and habits; in fact, the infantry was very slow in resigning itself to diminishing the density of occupation of the front lines, a result which was only attained after it had been provided with numerous and powerful automatic weapons (end of 1916).

On the other hand, the French command was busy, as we have already said, with the creation of a second position, in case the first should be broken. The work, started in the beginning of 1915, was pursued throughout the year along nearly the whole front.

Finally, defensive organization, as it was understood, that is to say, in lines of continuous trenches, had the disadvantage of absorbing a great number of effectives and a great amount of labor. Furthermore, the effectiveness of the artillery preparation reduced the confidence which up to then had been placed in continuous lines of trenches. For, it had been necessary, on the one hand, to make troops available for the large attacks; and, on the other hand, after a winter passed in the trenches, to reinstruct the officers and troops in view of offensive combat. Thus higher commanders were led to consider the substitution of centers of resistance, separated by passive sections

well beaten by fire, for continuous lines. It was a question, as is indicated by a Note of 20 June, 1915, of "perfecting the defensive organizations in such a way as to permit the constitution of available troops, while at the same time preserving the inviolability of the front".

In short, we were coming back to pre-war ideas. These centers of resistance, called forts or redoubts, appearing with striking clearness on air-plane photographs, were destined to become nests of projectiles, where the essential organs of the defense were to be easily destroyed.

Although that organization did not become general (and it could not be made so on active parts of the front), it was applied, in particular, to the defense of the region of Verdun.

(76) b. On the German side. -- The Artois offensive had failed to break the German front; also, after the danger they had run, our enemies took account of the necessity of the echelonnement of positions in depth. As early as the beginning of 1915 the appearance of some works revealing the organization of a second position had been seen; but, these were only a beginning, which by 9 May were far from being finished; beginning with that time, on the contrary, our adversaries went to work with the method, sense of continuity and desperation which characterize them.

In addition, German General Headquarters published in June 1915 the "lessons of the war on field fortification", in which we find the basis for defensive organization to be executed.

If a stubborn defense was to be made, at least two positions must be available, spaced sufficiently far apart so that the capture of the second position will require a new attack, and, consequently, the displacement of the hostile artillery: "As to details, the distance is determined by the terrain; it should be at least from one to two kilometers and even greater depending upon circumstances".

Further on we read in an Instruction of the XI Bavarian Corps, dated 7 June, 1915:

"The clearly stated intention of the enemy to make every effort to continue his infantry attacks in unceasing assault of our positions, (French Instruction, 16 April) should renew our conviction of the necessity of completing our first line defenses, by means of infantry, artillery and fortification, so that in the most unfavorable situation for us, the very capture of that first line will tend to exhaust the adversary. A series of other positions should facilitate the resistance; and force the enemy, in case he has succeeded in taking the first position, to recommence a regular attack against each one of these positions." And, further: "The second position must be gradually organized exactly like the first position; it must be made up of several trenches, one behind the other, like the principle that terrain must be ceded to the enemy only foot by foot and only through necessity, intermediate positions will be organized wherever natural strong points or where special conditions of the terrain permit, and also in places where there is considerable distance between the first and the second positions". (General von Below, Commanding the II Army, 1 August, 1915).

(77) Thus, the Germans were decided, not only to actively pursue the construction of a second position, but still to make a stubborn defense of the first line. "The fundamental principle is that the first line trench must be held under all circumstances; and if the enemy succeeds in penetrating it at certain points, he must be ejected from the position immediately In case of hostile attack, the trench must be occupied by adequate forces". In no case, must the effectives of the first line be reduced to provide units in support and reserve. This would nullify the principle that the first line trench must be held at all costs. Supports must be held in the second and third lines, at critical times, ready for immediate use; they will be reinforced, when necessary, by a part of the reserves". (General von Below, commanding the II Army, 1 August, 1915).

Like us, however, the Germans proscribed that the first lines would be held with only the minimum forces, and that main reliance would be placed in counterattacks to regain lost ground; in normal times, large units were to be greatly echeloned in depth and were to have only weak effectives on the front; in case of attack, the length of our artillery preparation was counted on to bring up the reserves; but the obligation of defending the first line trenches to the last led fatally to a condensation of effectives in those trenches.

Thus there appeared on both the French and the German sides an inclination in the same direction:

-- strengthening the defense of the first position in order to effect economy of forces;

-- organization of a second position beyond hostile mean artillery range;

-- echelonment in depth of all artillery dispositions.

Nevertheless, on our side must be noted a definite repugnance for digging.

A Note of 20 August said: "Some units consider construction work to be beneath them. Good infantry should be apt with the spade as well as with the rifle."

"Front line troops will not be permitted to use auxiliaries to organize their trenches". It must be admitted that it took a long time to get rid of this troublesome state of mind, in spite of the efforts of the command, which proscribed "our defensive organizations must be perfected without let up, although they may never be considered as complete or adequate".

On the German side, on the contrary, very great activity and a real aptitude for field fortification were noted on the part of the troops; the command closely supervised this work, if we can judge by the instructions which regulated the smallest details. Furthermore, the Instruction of June, 1915, relative to the lessons of the war on field fortification, specifies that "the infantry should be able to organize and complete their trenches, without supervision by pioneers, especially under hostile fire; the infantry should be trained in pushing its trenches forward while the members of the working party remain under cover at all times (attack saps), and in constructing simple accessory defenses of material available on the site".

In brief, the Germans were in advance of us as regards everything connected with the defensive organization of positions.

4. The Champagne-Artois offensive (25 September, 1915). -- a. Changes in the situation. -- Shortly before our offensive of 9 May, the Germans had launched a major offensive against the Russians, who had become threatening, in order to prevent them from penetrating into Hungary. The attacking mass, about a million strong in Austro-Germans, under General Mackensen and prepared for the Galician offensive, unknown to the Russians; the latter occupied three successive positions (6 or 7 lines of trenches) which were staged in abrupt mountains; the front of attack selected was relatively narrow, in spite of the fact that the artillery materiel available was considerable.

After an artillery preparation lasting less than twenty-four hours, the attack, launched on 2 May, seized the first Russian position; on 3 May it took the second position, on 4 May the third position, and beginning with 5 May war of movement was renewed by an exploitation which was without let up or rest. The tactical penetration was transformed into a strategic penetration, the dislocation of the front was communicated from unit to unit to such an extent, that the breach opened on 2 May on a front of 16 kilometers, on 5 May had reached a width of 140 kilometers, and on 8 May 200 kilometers.

The Russians, completely surprised and also lacking in materiel, arms and necessary munitions, were forced to make a hurried retreat along their whole front; and left 50,000 prisoners in the hands of the Germans.

This sudden and massive offensive against a fortified front, made with the support of a very powerful artillery of the rapid fire type, which permitted of a very short preparation, met with complete success, thanks to the effect of surprise, which could thus be obtained. The same methods were, furthermore, employed by the Germans on our front, but on a much smaller scale. Thus, their attack on Bagatelle, in Argonne (30 June, 1 and 2 July), was preceded by an artillery preparation of only a few hours; on the other hand, in this attack they used their asphyxiating shell, in large quantities to put down barrages in rear of the positions to be taken in such a way as to isolate the front line troops from the reserves.

Thus, an attempt to secure surprise by a very short artillery preparation and the use of gas projectiles in large quantities; such were the new characteristics which the Germans were able to give to their offensive operations, thanks to their heavy, rapid fire artillery materiel and to their disdain for the human conventions of the Hague.

Independently of these particular methods used by the Germans and which will have to be seriously considered in our future operations, a new fact had developed since 9 May, which did not seem to have made enough impression. That is the organization, on both sides, of a second defensive position, paralleling the first, and far enough away from it to escape the effects of the artillery preparation. The organization of the terrain over a great enough depth will allow the defender, if he knows how to make use of it, to escape the danger of a violent (80) and rapid break through by forcing the assailant to renew his efforts and to lose precious time, which the defender himself will make use of to bring up his reinforcements, and if necessary, to create new lines of defense; the effect of surprise from now on will be less to be feared.

Now, we may say that this second position did not exist in May, 1915, but the Germans will be able to oppose such a position to us on 25 September. The report of General Potain, commanding the II Army, on that offensive says:

"The second German position was located at a distance of from 5 to 6 kilometers in rear of the first on the north slope of Dormoise (Champagne), and was therefore out of range of our light artillery. Work on it had just begun at the end of July; but as soon as our approach works were commenced, the enemy went feverishly to work. Our heavy pieces, in the absence of any others, made a serious effort to hinder the work; unhappily they were too few in number and too meagerly supplied with ammunition to obtain any decided result. In spite of all this, when the attack was delivered, the trenches had not been completely finished; on the other hand, the flanking elements of the defense were all in place, as well as barbed wire, which was even more resistant and thicker than usual. That line had been definitely well entaglished and its resistance was increased by its trace on the counterslope, which rendered it absolutely invisible to our terrestrial observation posts".

Knowing the existence of that second position and being aware of our inability to destroy it, were we to persevere in our attempt to break through, with violence and with a single impetus, as laid down in the Instruction of 16 April; or were we rather to procede with more circumspection?

It does not seem that that question was faced, at least at that time, with all the attention which it deserved. The German positions in Champagne, like those of Artois, were attacked in accordance with the Instruction of 16 April, 1915, which were well adapted to the situation of the beginning of the year; but which were no longer applicable to the penetration of a fortified front composed of several positions echeloned in depth.

We did not perhaps very well realize that, by that fact, the defense had attained a marked advantage over the attack, such as we conceived it; that is,

(81)

from then on it could oppose to the attacker, who would be advancing without cover and over unknown ground, hidden reserves, who, having escaped our fires and who, thanks to previously established liaison, could combine the action of their infantry and artillery against our infantry alone, which had progressed beyond the range of its guns.

In applying the methods of the Instruction of 16 April, after the attack had seized the first position, it ran the risk of breaking up against the second position, even though the enemy were not alert; because without the benefit of any surprise, it would meet at that position obstacles which had not been destroyed and which were defended by fire. If the attack persisted in such action, it could only add to its losses which could not compensate the results which could be hoped for.

To surrup, the following were to oppose the rupture of a front organized in depth and defended by an enemy in full possession of his means.

First of all the impossibility for us to secure complete surprise; our artillery preparations, necessarily long, (1) could not let the enemy remain in ignorance of our intentions; thanks to that notice he was to have time to organize his resistance in depth.

Then, our attack, once launched straight to the front, to the end of its course, but inadequately supported by artillery it was to stumble over the first obstacle that it was to encounter.

Now, every operation from which maneuver is excluded is bound to be checked sooner or later, because without maneuver there is no surprise and without surprise there is no success. If, then, the enemy succeeds in plugging up the breach, there is no use of going farther, some other way must be found. We shall have occasion to return to this question.

82) b. The attack of 25 September, 1915. -- The plan of operations for 25 September for the first time contemplated two combined and simultaneous attacks; one in Champagne (Group of Armies of the Center, General de Castelnau), the other in Artois (X French Army in liaison with the I English Army).

If successful, these two offensives were expected to produce far reaching strategic results. By penetrating the hostile front in the region Sainte-Menehould-Reims, on the one hand; and in the region of Arras, on the other hand there was the chance of capturing a part of the hostile forces occupying the Peronne-Noyon-Soissons salient, and to force the enemy's disposition to fall back a considerable distance. We had sufficient troops available to allow us to expect such result; for on 1 September we had a superiority over the enemy of about thirty Franco-British divisions. On the same date, the German reserves on our front did not exceed six infantry divisions; but by 25 September they had been reinforced by two elite corps (the Guard and 10th Corps), which had been brought back from Russia and were thrown into the second positions of Champagne and Artois.

The front of attack in Champagne measured about 35 kilometers; nearly 900 pieces of heavy artillery and more than 100 75's were assigned to it. In Artois the front of attack of the X Army was much narrower, 9 kilometers; only 250 heavy guns were assigned to it. In all, for both Champagne and Artois, there were 53 infantry divisions, 9 cavalry divisions, 1140 pieces of heavy artillery (2) 500 trench mortars caliber 53 and 30 trench mortars caliber 240.

(1) There must be included in the length of the artillery preparation, not only the few hours of fire, mentioned by the Instruction of 16 April, immediately preceding the assault; but also the fires for adjustment, which were spaced over several days.

(2) Among which were some 280 Mortars (Schneider) and 370 Filloux, which had been built since the war.

(83) Starting with the beginning of August, extensive work was done on the terrain, for the emplacement of the artillery as well as for infantry; parallels and assembly positions (1) increased in number in the immediate neighborhood of our first lines, while long communication trenches led as far as 5 kilometers to the rear. The artillery positions were pushed very far forward; especially those of heavy guns so that they could reach the distant batteries of the enemy; finally, numerous hangars were built for our aviation which was to, by its superiority, assure mastery of the air (at the time of the Champagne attack we had 200 planes as against the enemy's 60).

All these preparations could not let the enemy remain in ignorance of our offensive projects; furthermore, the artillery commenced its adjustments six days before the beginning of the preparation, which itself lasted a little more than three days (75 hours) in Champagne, and five days in Artois. (2). The enemy was perfectly informed of our intentions, the only thing he did not know was the day and hour of the attack. Feeling the imminence of danger in Champagne, on 24 September he withdrew a large portion of his artillery to the north bank of the Dornaise. General Petain says in his report: "We had taken the precaution to push our heavy guns well to the front, otherwise we would not have been able to counterbattery the hostile artillery on the day of the attack".

Finally, note in the same report: "on account of the inability of our artillery to reduce effectively natural strong points we had selected a zone of attack which did not include any village; between Trou-Bricot and Bersie Road".

(84) As for the troops who made the attack, they still had a very high morale in spite of the only slight success of the 9 May offensive and of the check of the 18 June offensive. This time there was hope of better luck, for we still had faith in victory. And then the amount of artillery deployed and the number of troops participating in the attack (35 infantry divisions in Champagne, 18 French infantry divisions and 13 English infantry divisions in Artois (3), more than 15 cavalry divisions, including 6 English), were enough to encourage those who might still have been shaken by memories of Artois. On the other hand, the combatant no longer believed the more or less official information on the condition of depression and exhaustion of the enemy. He had been told too much, prior to 9 May, that the Boche was under-nourished, was lacking in munitions and that he would be an easy prey. His own observations had shown him that none of this was true; and, from then on, he gave credit to such stories, which he styled, regardless of their source, as bunk (4); and he was to maintain this opinion through the war. This indicates a danger of starting, or of allowing the circulation of rumors, of which we are not absolutely sure. The soldier is perhaps taken in by them once, but never twice; and, essentially distrustful by nature, he soon believes only what he sees.

(1) places d'armes.

(2) On 9 May we had noted that an artillery preparation of a few hours as indicated in the Instruction of 16 April, is absolutely inadequate with our slow fire materiel, to obtain the destructive effects sought. From now on, regardless of the time taken for adjustment, the fires in the preparation proper will last several days.

(3) Information given by General Joffre in an order of 22 September to be read to the troops and in which he added: "Three-fourths of the French army will participate in the general battle. Every chance of success has been taken advantage of".

(4) Bourrage de Crane.

On 25 September, the infantry attack was delivered after several hours fire of smoke and suffocating projectiles. (1). In Champagne, in spite of bad weather, the attack progressed fast enough in the vicinity of Souain; the folding back movements, to the right and left, allowed the widening of the breach to a width of 20 kilometers; the hostile batteries located between the first and second positions were captured; but after having conquered three or four kilometers of ground, the attack broke down in front of the second position, whose defenses were intact, and which the enemy had promptly occupied with all his available reserves (including a recruit depot). It was impossible to renew this attack, and a new attack, started on 6 October, against an enemy who had collected himself, was not to be any more successful than that of 18 June. Nevertheless the Champagne offensive took 25000 prisoners and 150 guns.

In Artois, the attack of the X Army gained ground only in the vicinity of Souchez and was soon halted. The English put into action 13 divisions, of which 6 were in first line; their attack was assisted by the use of cloud gas, which enabled them to get over the 300 to 500 meters which separated the two opposing lines. In this way they seized Loos and Hulluch, creating a breach 6 kilometers wide and 3 kilometers deep; but, like in Champagne, their attack broke down in front of the enemy's second position.

Thus, in spite of partial success, since the enemy's front could not be broken, the attack of 25 September broke down like that of 9 May.

5. Lessons of the Offensive. -- Various Notes of the Commander-in-Chief, which appeared at the close of 1915, sought to throw light on the causes of the initial success and of the final breakdown of the offensive of 25 September. The initial success consisted in the break through of the hostile first position, which had been perfectly prepared from every point of view; the offensive preparation of the terrain had possibly been overdone, the artillery had produced all the results demanded of it in destruction, harassing and counter-battery.

The final check resulted from the inability of the attack, which had been disorganized by the first assault, to go up against the second position (2). This inability was caused by the lack of reserves at favorable points, or by the inability of such reserves to get into action when needed. Experience demonstrated the advisability of immediately continuing the attack with fresh units along the whole portion of the front where we had made early contact with the German second position. It demonstrated as well the advantage that would have been to exploit the advance of the 14th Corps on Trehure and Ripont by throwing in a fresh unit before the Germans could have had time to reorganize; this would have caused the Butte-du-Monil to fall like Trou-Bricot fell. Finally, it demonstrated the difficulty of rapidly engaging a second line corps (6th Corps) behind a first line corps (2d Colonial Corps).

Such were the lessons of that offensive against fortified positions, which long stabilization had allowed the Germans not only to bring to a high state of power, but also to echelon in depth. And, a Note of 5 December said: "warfare of positions which the enemy has organized in our front during the last ten months has changed in character".

(1) This was the first major offensive in which we used asphyxiating shell in sufficiently large numbers; but these tentatives were still timid, for we used only lachrymatory and suffocating gases.

(2) Our infantry was precipitated, not only against accessory defenses of the second position which were practically intact and which were placed on reverse slopes, but also against the fire of machine guns located in the open and whose efficacy was frightful. This observation later led us to take these sensitive weapons out of our network of trenches and communication trenches.

If it had been demonstrated once again that the defensive organization of the first position could not resist the methods of the attack, it was (86) that the capture of the second position presented difficulties which we had been able to overcome.

In the opinion of the Commander-in-Chief, the causes of this final check were due:

1. To incomplete instruction of the infantry and the artillery: reserve units had pushed up on and mingled with the attacking line, and caused such disorder there that the attack could not make an offensive effort against the second position. The artillery, on account of ineffective organization of observation and liaison, had not succeeded in destroying either the access defenses or the flanking elements of that second position, with the result that all the infantry attacks broke up against these obstacles;

2. To lack of command which did not understand how to get into action at an opportune time all the means required for an effective preparation against the second position. In some cases division commanders, in ignorance of the situation of their front line, were led to prescribe attacks which could not succeed. Thus, the command should be near the troops so that he can easily get information and to get information of the situation by personal observation at an opportune time, to be able to prepare rapidly a new attack.

A unit which has delivered an assault over a depth of several kilometers across organized positions is bound finally to come to a halt. Such halt should therefore be discounted, "but its position cannot and must not be decided beforehand. Such action would, a priori, limit the results of a well prepared operation and would forego unforeseen advantages. It follows that the principle of assigning distant direction points to large units should be retained; the large units should be assigned initially successive objectives against which preparation by the artillery should be started before the attack, and again which preparation by the artillery should be continued as the attack progresses. The advance of artillery during the battle is therefore essential and will require an appreciable period of time. There is no doubt that an offensive battle should be executed with rapidity, so as to exploit the effects of surprise, of disorganization and demoralization produced by the first successes, to the (87) maximum; but no argument can get away from the fact of the obstacles which encountered and which must be destroyed to permit the advance. (1)

The offensive of 25 September brought out anew the following conclusions:

The value of reconnaissance, the basis of decisions;

The importance of preparation, a condition for success;

The necessity for the command, which cannot pretend to provide in advance for the development of the battle in organized terrain, to personally direct the execution;

Future general operations will therefore continue to be conducted in accordance with the principles of the Instruction of 16 April, 1915 as regards the initial organization of the assault against a fortified position "they will take the form of an attack which is pushed to the limit, all measures being taken not only to profit of every weakness of the enemy, but also to continue the action as long as it may be necessary".

The correctness of the above observations, which are based on facts, is not open to question. They seem, however, to need to be more clearly defined. It must not be forgotten that the Instruction of 16 April had grounded in the command and the troops the idea that fortified lines should be carried in a single impetus, without any intermediate halt, and that this was the way to insure the rupture of the front which was the object of all our major offensives. Furthermore, it had not been supposed that the second position, whose existence was nevertheless known, could stop the attack any more than it had been supposed that the third or fourth defensive line of the first position could do so. However, this was a new problem which required, as we said, new dispositions which we must admit had not been taken. Why then should

(1) Note of 27 December, 1915.
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we be surprised at the disorder of the attacking troops, when they ran up against the second position, practically intact and defended by fresh troops; at the difficulties of the artillery whose observation and liaison service was still in an embryonic stage, in its attempts to improvise a new and effective preparation; and, finally, of the inaptitude of the command to handle new problems, at short notice and even during the course of the action, for which it was in no way prepared?

28) The great cause of final failure appears then to be chargeable first of all to the ignorance of the command and the troops of procedure to be employed in overcoming successive organizations echeloned over great depth. This new fact, which was not expected, may be properly called a surprise which was bound to check the advance, for improvisation cannot be made on the battlefield. Was it not rather the business of the High Command to foresee, in adequate time, the possible consequences of this new situation; and to orient beforehand the executants on the procedure to be employed in order to avoid such surprise?

By analogy with the phases of siege warfare, we might have foreseen that the more organized positions appeared in depth, the more it became necessary to proceed with method in applying our means against each of them, until (instead of having to take a central keep) the assailant should find open terrain in his front.

It was therefore not enough to apply some restrictions to the instruction of 16 April; the adoption of an entirely different method from that which had been laid down by that instruction was needed. The Commander-in-Chief was well aware of this, although he had stated that the events of 25 September had not modified the general lines of the Instruction of 16 April; he was already preparing on new bases the series of Instructions which were to appear during the course of January, 1916.

As to the procedure to be adopted by the attack, three points were from then on decided:

The necessity for handling the various hostile positions in turn;

The importance of maintaining the attacking troops in order during the whole development of the assault;

The disadvantage of engaging corps one behind the other, and consequently the advantage of engaging them initially in line, so as to be able to place the second line divisions, which were destined to prolong the action of the first line infantry divisions, under their direct orders.

39) 6. Lessons on the organization of the ground and on the conduct of the defense. -- After the indecisive offensives of 1915, dispositions were taken to tide over the second winter and thus wait for the spring of 1916, towards which all hopes were directed.

Our armies were thus to assume a waiting attitude until operations might be renewed. The Commander-in-Chief, therefore, issued his directives for that expectative period, which was to be employed not only in improving our defensive organization, but also in preparation for the offensive of 1916.

These directives may be summed up as follows:

a. The experience of 25 September had shown that, to accomplish its mission, "the second position should be so placed as to escape the action of the hostile artillery against the first position. It was to be dissimulated as far as possible from direct and aerial observation, by making full use of woods and counterslopes. The organizations already constructed were to be modified or completed accordingly (1)".

(1) Our second positions in 1915 were generally too close to the first position and could be used only as intermediate positions.

Moreover, fortified localities were to be organized in rear of the second positions for the purpose, in an emergency, of canalizing the forward movement of the enemy's forces and to be used as strong points for counteroffensive maneuvers.

b. The purpose to be accomplished by the general organization of army front was to permit the offensive to be taken without necessary long preparatory work so that the greatest possible effects of surprise might be attained.

The fact was, as stated by General Petain in his report, that all our schemes of attack for 25 September had been disclosed to the Germans by our preparatory installations and not by the arrival of troops for the attack.

The idea of making preparatory installations for the offensive along the greater part of the front was not a new one; it seems that it first appeared immediately after the offensive of 9 May, for we find in a Note of 20 May: "Whenever it can be expected that an offensive may be delivered, either by troops already in position or by available troops who may be brought up for that purpose, the terrain in rear of the trenches should be prepared. In all cases, only works which do not risk compromising the local situation will be installed: Communication trenches, assembly places, battery emplacements, bombing emplacements, etc....., to the exclusion of parallels in front of the first line trenches, which must not be constructed until after the offensive has been decided upon. Those works, installed upon different parts of the front will cause the enemy uneasiness, and will keep him in a state of uncertainty as to the real points of attack which we have selected.

"They will allow us to gain much time in the immediate preparation of our ulterior offensives."

Thus, to the notion which we already had of gaining time by preparation of all offensive action, there was not added the idea of making every effort to attain surprise, which appeared to be essential to any attack. "The importance of proscribed works is capital in order to permit us to undertake rapidly and by surprise all the operations which the general situation shall demand". They should be executed without delay and they should be completed as soon as possible. Certain of these, which will take a long time to complete and which cannot be concealed from air observation, should be executed all along the front and in advance, so that their appearance in a determined locality at the last moment may not disclose the intentions of the command. (1)

Such were the orders; they indicated a very clear understanding of what must be accomplished in order to attempt successfully further offensives. Unhappily, the works proscribed required considerable labor, which could be furnished only by units at rest in rear of the front. Now, there were few of the latter, and they needed further instruction; thus, at many points, the offensive equipment of the front was hardly started during the winter of 1915-1916; elsewhere, the events in preparation for the following spring were to prevent their accomplishment; this is why we shall again find the same preoccupation, repeated in the instructions of 1917 and which were justified by the fact that the previous orders could not be carried out. But it was the High Command of 1915 who had the first idea of that conception of offensive operations and of which we shall have to take up again later on. (91)

c. The defense was to be organized and conducted in accordance with the principles which were laid down immediately after the offensive of 9 May; the power which the attack had acquired no longer permitted reliance on indefinite resistance of fortified lines. Also, the Note of 5 December, 1915 said: "defensive situation should be handled in accordance with the method which was in force in our army until the beginning of the war, which consists in containing the hostile attack by the most appropriate means, but with a minimum of forces, than in fighting by means of a counteroffensive executed with the maximum of means."

(1) Note of 22 October, 1915.

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The front line troops, reduced to a minimum, will thus assure the holding of the front, with the mission of resisting all attacks for the time necessary for the commander to group his forces for his own offensive. The first line trenches, generally continuous, were thus to form the battle position of such outposts, which would be supported by a zone of passive obstacles, well concealed, the defense of which could be assured almost exclusively by fire.

Protected by this network were to be echeloned the bulk of the forces, divided into corps reserves, group of armies reserves; and the offensive battle field, which is mentioned above (strong points, shelters, buried communications, etc.....), was to be prepared. All the forces, economized in first line or held in reserve in rear, were to be used either in immediate counter-attacks or in counteroffensive.

On the whole, the defensive organization was based on modernized pre-war principles; there were still to be centers of resistance, but they were to be connected in groups by continuous trenches, to form active zones, which were to be separated by passive intervals. However, with regard to the echelonnement of positions, the pre-war dispositions were abandoned; the advance position disappeared and we now find remaining only a first position, a true position of resistance, sometimes paralleled by an intermediate position, whose defense was confided to the divisions in sector; and a second position five or six kilometers in rear, defended by corps reserves. On the other hand, the organization in depth of each position was accentuated; in fact, three lines are found in each position; the front line, the support line, and the line of redoubts.

Up to this time, the artillery of the defense had manifested its activity by scarcely more than barrage fire at the time of the attack. It was not inclined towards the destruction of the infantry and the destruction of offensive preparations of all kinds. Thus it is to respond to the hostile artillery preparation by analagous fires (the origin of offensive counterpreparation which was perfected at Verdun), then during the assault it is to concentrate its fire on the hostile infantry. Finally, it is still to retain the mission of destroying the opposing artillery by adjusted and precise counterbattery fire.

To sum up, the Note of 5 December does nothing but restate under another form, the principles laid down by the Note of 8 July, 1915; but it must be noted that all this defensive system was based on this fact, which was also brought out by the Note of 5 December, that "the dangers of an important surprise attack have become very slight; the offensive requires the introduction of such vast means that these latter cannot escape the vigilance of the defense".

This observation was very correct, it was a result of the great attacks, which had been attempted up to this period and it was in complete accord with our own conception of offensive operations. But at this time we can very well stop and ask ourselves whether it will be verified in the future. For, the Germans in Galicia (2 May, 1915) and in Argonne (30 June, 1 and 2 July), already had shown their tendency to reduce the length of the artillery preparation. We must not forget that they were superior to us in rapid fire heavy artillery materiel, which allowed them, with an equal number of pieces, to fire, in a given period of time, many more projectiles than we could fire, on the other hand, the constantly increasing use of gas shell is to give the attack the means of neutralizing hostile forces instead of destroying them, and is to thus still further reduce the length of the artillery preparation. (93)

Thus we see that the idea propounded in the Note of 5 December corresponds rather to the procedure in the offensive which we were obliged to use, than to those which the enemy seemed to have in mind to adopt. In reality, the study of our opponents tendencies should have made us fear a surprise attack in force, or at least an attack with a very short artillery preparation. Our study of these tendencies did not forewarn us of such an eventuality; the events of Verdun were not slow in proving it.

7. Lessons on the defensive gained by the Germans. -- Several documents fell into our hand, particularly a Note of General von Below, commanding the II Army, dated 5 November, 1915. These gave us the conclusions which the Germans

had drawn from their defensive operations of 1915. The first was that the second position was capable of stopping the penetration if the first line troops held at all costs on their battle positions.

General von Below said: "We must thank our troops for their stubborn resistance and congratulate ourselves on the lack of decision of the French infantry, who did not know how to take quick enough advantage of initial success; in this way the second position was not penetrated, and there was time available to occupy it with adequate forces

Only a desperate resistance to the last man give sufficient time to move up reserves and to occupy the rear position, thus preventing the enemy from penetrating."

But this principle of the defense of the first lines to the death resulted in a fatal condensation of reserves in those lines (1) during the artillery preparation; this might be brought about by reinforcing the occupation of a part of the front which might be considered too weak (the front line battalions 94) were holding a front of from 300 to 600 meters), or by replacing losses. Also, in numerous cases, battalions in support, in regimental or brigade reserve, and even those which had been placed at the disposal of the divisions were absorbed by the defense of the first position before the attack was launched. Whence the necessity for maintaining the assignment of troops in depth, particularly machine guns in the support positions, in order to insure that the enemy will encounter continuous resistance to his advance.

It was recognized that "the moral effect of more than three days preliminary bombardment of the greatest intensity is naturally considerable;" this explains how several first line units were surprised in their shelters without having time to defend themselves. On the other hand, our gas shelling did not seem to have accomplished any serious result.

During the battle, we note, that "the High Command has the greatest difficulty in getting a clear picture of the situation". whence the necessity of increasing all the means of liaison.

Up to this time the attitude of the artillery had been purely defensive; it had been based on the efficacy of barrage fires; during the battle of Champagne, it may be said that the German artillery did not use destruction fires or counterbattery fires. From that period on, it was to concentrate its efforts on the annihilation of the opposing infantry, its preliminary works and its shelters (2), rather than on counterbattery against the hostile artillery; in this respect, the Germans were behind us; they still had not understood the full importance of counterbattery (3). On the other hand, it must be noted that the cooperation given the infantry by the artillery was excellent, wherever infantry and artillery commanders had neighboring command posts. "The artillery failed only when there was a lack of ammunition, and that happened at several points even the first night of the attack". A supply of projectiles must therefore be accumulated in good time at the battery positions, and this supply must be kept up by numerous additions during the artillery preparation.

Finally, like us, the Germans concluded that the surprise attack was impossible against wherever the line is protected by a thick and substantial 95) obstacle; any attack on a grand scale had to be prepared and "to date the preparation has been distinguishable. This allowed the High Command to bring up its reserves in men and munitions in ample time". We have shown that this situation was more correctly expressed by the Germans than by us.

- (1) It was to require the lessons of the Somme to change German opinion on this.
- (2) This was the origin of fires of annihilation.
- (3) They did not use it as fully as we until the end of 1916.

III - Conclusion

1. -- At the end of 1915 the original offensive doctrine began to be adapted to the requirements of position warfare.

The idea of mass in the attack gave way to the idea of the fire power, which was thought of principally in terms of artillery and which is to constantly increase; infantry formations had a tendency to decrease in density, but they were still too dense.

The importance of the combined arms on the battle field was becoming more and more apparent; procedure to produce liaison were becoming perfected thanks to the development of air service, but liaison was still not altogether satisfactory.

On the other hand, the new form of war, as we are about to see, caused two essential ideas to be lost sight of, that is, surprise and maneuver.

No special dispositions had been taken to insure exploitation of success, with the exception of the employment of cavalry in battle.

2. -- In our offensive procedure, method was considered to be indispensable in everything connected with preparation; but in the domain of execution, method was in opposition with that other no less imperious requirement, rapidity and continuity of the attack. We were confronted by two conceptions: one, defined in the Note of 2 January took into account the limited effects of our artillery materiel and laid down successive attacks; the other, crystallized by the instruction of 16 April, was based on the disadvantages which had been found in the first method, these disadvantages militated against the execution of violent, rapid, continuous attacks made for the purpose of pushing through to open terrain. After 9 May, experience had produced results, and it could be said that method had been perfected; if the artillery materiel was still imperfect, it was at least adequate to permit breaking in a fortified position of slight depth. (96)

Thus in the eternal struggle between the projectile and armor, the projectile was very near to winning, when the adversary, following the approach of danger, hastened to parry it.

The appearance of second positions on 25 September proved our offensive method, which we had so laboriously built up, to be false. It was going to be necessary, as we shall see, to go back to the principles of the Note of 2 January, 1915, that is to say, to a "slower and more methodical development" of operations; in other words, to successive attacks. Order and method in execution were sharply to take the ascendancy over rapidity and continuity. Briefly, whether we liked it or not, experience was leading us by degrees to the application of the special procedures of siege warfare.

3. -- What is striking in all our attacks of 1915 is that we were never able really to obtain surprise, and this may be laid to two causes which we have already brought out:

-- offensive preparation of the terrain, which became more and more developed and which gave the enemy information of our intentions a long time in advance;

-- the artillery preparation, preceded by a period of adjustments, and which warned the enemy of the imminence of the assault.

In spite of that, we read in the different reports on these operations that the Germans were nearly always surprised, which is true. But it is important to understand what we mean by the term surprise in this case.

It is true, the enemy was often surprised when, after submitting, within his shelters, to a bombardment of several days and after having been deceived by false attacks, he failed to discover the exact time at which the assault was delivered, and thus did not have time to occupy his battle positions. In many cases, that is what we called surprise.

It was therefore necessary to make a sharp distinction, as was done later in the Instruction of 31 October, 1917, between:

- (97) Strategic surprise, which, leaving the enemy uncertain as to the region in which he may be attacked, prevents him from intervening with his general reserves or to execute preventive maneuvers in adequate time; it corresponds to the preparation period of the attacks.

Tactical surprise, which, leaving the enemy uncertain as to the exact time of the assault and of the front selected in a region which he knows in advance, prevents him from putting his fires and local reserves in action in favorable condition; it corresponds to the period of the execution of the attacks.

At this period of the war it does not seem that we were very much impressed with this question. The Note of 2 January did not even mention it; while the Instruction of 16 April simply stated that the necessity for minute preparation "does not exclude for the command, the duty of insuring secrecy of operations by every possible precaution, and of conducting the attack so as to secure the benefit of surprise". We therefore implicitly admitted that, in position warfare, strategic surprise is scarcely attainable; and we limited our endeavor to secure tactical surprise to within the scope allowed us by our attack procedure. The adversary could be deceived only as to the real extent of the front of attack and the hour when that attack was to be delivered; the Amendment of 26 May frankly admitted this when it said: "It is essential to keep the enemy uncertain as to the real time of the assault."

Furthermore, the secrecy of operations, already disclosed by preparation of the terrain and then by a too long artillery preparation, was poorly kept. Too many authorities were familiar with the projects of the High Command, and they did not always observe adequate discretion; no degree of the hierarchy considered the absolute necessity of maintaining secrecy. The neglect was so glaring that the immoderate use of the telephone as far as the front lines gave the enemy the opportunity of getting information, by listening in, of the last preparations and sometimes of the hour of the attack. Under these conditions, why should we be surprised at the failure of certain operations?

- (98) However, after 25 September, there was noted a preoccupation on the offensive equipment of all parts of the front which were suitable for the offensive, so as to permit the realization of strategic surprise at any time. Thanks to that procedure, which was first thought of in May, 1915, we could then do away with the period of several weeks which had to be devoted to offensive preparation of the terrain, or at least considerably shorten it. This, no doubt, would have been a great step in advance; but it still would not have been enough to insure complete success. If strategic surprise could have been attained in this way, tactical surprise could not have been obtained until we had available enough heavy artillery materiel to allow us to reduce the duration of the artillery preparation to a few hours, and we had not then arrived at that point. Nevertheless, the enemy was now to be informed of the zones chosen for our offensives only a few days in advance instead of several weeks.

The Germans were not troubled in the same way and seemed, on the contrary, to be centering their efforts toward an effort to secure as complete surprise as possible. With their heavy rapid fire artillery materiel and not hesitating to use asphyxiating gas, they had the means of realizing strategic and tactical surprise in their hands. Furthermore, their efforts in Galicia and in Argonne were proofs that they were about to adopt such methods.

What could we have done in such a situation?

From then on it seemed impossible to take in a single effort fortified positions which were too deep to be covered simultaneously by our artillery. It was then necessary to proceed by several steps in order to take time to effect the necessary artillery displacements, a period of time which is much longer than is generally imagined. Whence the lack of rapidity and continuity in the succession of attacks, and consequently, the greater facility for the enemy to reorganize and to reestablish the equilibrium. Then, why make every effort to secure strategic as well as tactical surprise upon the selected front of attack, if it was known in advance that it would be impossible to

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fully exploit it? Such an offensive could only be directed at the reuse of the hostile forces, but not at the break through of a powerfully fortified front.

However, strategic surprise is not obtained solely by the measures taken for concealing the preparations for an attack. It is also the result of maneuver. And, since the fronts stabilized, we had lost the habit of maneuvering as we maneuvered in open warfare; that is to say, to attempt to surprise an enemy, who was already engaged, really pinned down only on that part of the front where he is being attacked; on all the rest of the front he is in a position of readiness and, like us, he retains his freedom of action.

But experience had shown that the enemy was in the habit of responding to our first attacks by immediately sending in rear of the threatened front, all the units in support or at rest from neighboring sectors which were not being attacked. While these units counterattack to slow up our progress, the command had time to bring up stronger reserves (infantry division, army corps, artillery) to dam up the breach.

Could we not have taken advantage of this situation of the enemy, troops congested on the front of attack, sparsely held and without depth in many places, to deliver an unexpected attack against him and attempt to break through at one of the points where he had least resistance? In that case, it would do him little good to have two or three successive organized positions, if he did not have available the necessary forces to defend them. Would that not have been the real surprise and the only maneuver possible in that position warfare, which had suppressed all possibility of envelopment?

But that conception, as we must admit, is practicable only if there are available, on the one hand, many suitable sectors for attack which have previously been prepared; or on the other hand, infantry effectives, artillery materiel and the required munitions to simultaneously provide the means for several offensives.

This is a question which is solely within the province of the High Command. To judge by the measures prescribed for the offensive preparation of the ground, it is very certain that at that time the High Command considered this new solution of the problem of the break through. If it did not attempt the project, it was then because it did not believe that it had in hand the effectives and the materiel necessary to carry it through to a satisfactory end, and, in fact, at least our available heavy artillery did not appear to be adequate.

4. -- The offensives of 1915 cost us heavy losses (550,000 killed and missing compared with 300,000 in 1914), either because the necessary destructions may not always have been accomplished, or because the attack formations employed may still have been too vulnerable. There was also developing greater and greater demands for destruction to be accomplished by the artillery for the benefit of the infantry. Unhappily, we did not realize soon enough that infantry attack formations were too dense when confronted by modern armament.

On the other hand, these offensives had not culminated in the result which they aimed at, the rupture of the front; but it must not be forgotten that they were, nevertheless, important successes, which gave us a real ascendant over the enemy, and, in spite of losses, contributed towards exalting the morale of the troops.

In any event, their result was to attract attention towards the possibility of a much longer war than had been thought possible; in fact, it was from this time that we were to begin to organize for a long and sustained effort. After having given everything possible to the effectives, we were now to adopt measures to economize personnel; the incorporation of new classes from now on proceeded in succession with splendid regularity; we were to create scarcely no new formations and were to be satisfied to go ahead with the changes necessitated by position warfare.

5 -- The year 1915 marked considerable progress in the development of our aviation and in the role filled by it in the preparation and the execution of attacks. It was now beginning really, not only to assure mastery of the air, but to facilitate the action of the infantry and the artillery by its service in observation and liaison. Furthermore, it was at the end of 1915 (4 December) that the first instruction on liaison, which solved, in a practical manner, the delicate problem of the union of the arms on the battle field, appeared.

Likewise, our heavy artillery, though still far from being perfect, had been considerably increased; while the battle of Perthes had been fought with the support of a hundred heavy pieces, the battle of 25 September put 1140 heavy pieces and 530 trench guns in line; the simple comparison of these figures gives an idea of the effort accomplished. At the same time, the employment of heavy artillery had been codified in the Regulations of 20 November, 1915.

(101) 6 -- It is difficult, in speaking of the events of 1915, to pass in silence the considerable role played by General Petain, first as a corps commander in the attack of 9 May and later as an army commander in the attack of 25 September. Of a reflective mind, profound, and preeminently an organizer, he was one of the first to realize the particular characteristics of position warfare; and he introduced order and method in attacks, factors which he considered indispensable to their success. The brilliant results which he secured both in Artois and in Champagne are proof that his views were correct; also he was not a stranger to the reversal of ideas which were to rebut the Instruction of 16 January, 1916.

CHAPTER IV

THE YEAR 1916 --- PERIOD OF DEVELOPMENT

This period includes two major offensives:

German offensive against Verdun (21 February-11 July, 1916);

Franco-British offensive on the Somme (1 July-end of November, 1916).

It is therefore rich in lessons of all kinds; but before studying them, we must review the ideas in vogue at the beginning of 1916, ideas which were the result of the experience of 1915.

1. New conception of offensive operations. --

The new conception was set forth in three main documents which appeared in January, 1916:

The Instruction of 16 January, setting forth the purpose and the conditions of general offensive action;

The Instruction of 26 January, on offensive combat of large units;

The Instruction of 8 January, on offensive combat of small units. (1)

It is to be recalled that the offensive of 25 September, 1915 had brought out the difficulty if not the impossibility, of carrying, in one effort, the successive hostile positions, whose depth now exceeded the effective range of artillery.

Also the Instruction of 16 January, 1916 considered offensive battle as a series of attacks of successive positions and not as a single and brutal action. Hence the offensive was to be a matter of a battle conducted methodically from objective to objective and always including a minute artillery preparation.

The objective of each attack was to be made up of "an ensemble of trenches and batteries called a position, upon which the artillery preparation could be placed before the attack and continued during the advance, with or without displacement of a portion of the batteries".

Beyond the objective as thus defined, the attacking troops were to proceed to the reconnaissance of the next position and were to find the observation necessary for a new and complete artillery preparation.

The attacks were therefore to be interrupted by halts, whose length it was hoped would be reduced as much as possible by prescribing that the command should anticipate and should previously organize its different attacks, in such a way that they might succeed each other with the maximum speed. The Instruction of 26 January said: "It is by untiring activity in all echelons, that readiness is secured to attack before the enemy may be able to reestablish himself in a stable and orderly situation."

Such was the essential difference of conception between the Instruction of 16 January, 1916, and the Instruction of 16 April, 1915: it was a return to the principles of the Note of 2 January, 1915. However, the purpose to be attained still remained the same; penetration through the enemy's organized positions; but a penetration, which, instead of being rapid and violent was not presented as a long term operation.

(1) To these should be added: Instruction on the employment of aerial observation in liaison with the artillery, of 19 January, 1916; and Provisional Regulations on infantry liaison by plane and by captive balloon of 17 April, 1916 which was prescribed the employment of the infantry plane, which was so valuable as a means of liaison.

It was thought that, after taking the different hostile positions by the play of successive attacks, a new phase would open up, that is, the exploitation of success, in which the cavalry would play the principal part, "preventing the beaten enemy from reorganizing, from halting to make a stand and forcing his retreat in route." On the whole, that arm was to operate in accordance with the prescriptions of the Annex of 18 June, 1915, first the corps cavalry, then the cavalry divisions and cavalry corps. However, the Instruction of 16 January said: "the depth of the hostile defensive organizations no longer allow us to expect that the engagement of large cavalry units may follow the first phase of an offensive action". In order to insure the rapid intervention of such cavalry, it will be enough then that its leader follow the battle from near at hand (generally from the command post of one of the first line infantry divisions). Infantry units in motors may be attached to cavalry corps or divisions. Furthermore, "The fire power given to cavalry divisions by cyclists, light groups increased number of machine guns, machine rifles and auto-cannons, by augmenting their offensive and defensive power, makes them available for a wide range of missions".

In rear of the cavalry, the available elements of the first line division were to follow in a previously determined direction, and in such formations that "at the least hostile resistance, the infantry might be rapidly supported by a powerful artillery force".

Such was the conception; let us now take up the execution. No doubt we shall again find the prescriptions, which were contained in the Instruction of 16 April and which were confirmed by experience, on the subject:

- of the importance of counterbattery;
- of the necessity for offensive preparation of the ground for attacks;
- of the subordination of the delivery of the attack to the completion of the artillery preparation;
- of the role of the artillery; on the one hand, the destruction of obstacles which oppose the advance of the infantry; on the other hand, the accompaniment of the latter by barrage fires which displace to the different lines to be reached;
- of the development of the means of liaison, particularly between infantry and artillery.

Furthermore, it was the Instruction of 16 January which created the liaison and observation detachment, furnished by each artillery group charged with direct support of the infantry. This was a considerable step in advance, whose results were not slow in making themselves felt.

But the Instruction of January, 1916 introduced innovations in the manner of staging and executing attacks, so as to give them the Methodical and orderly character which was to guarantee success.

After having observed that the preparation of an offensive "has assumed primordial importance in the present war" and that it is one of the "indispensable conditions of success", the Instruction of 26 January divided the offensive into two periods.

The first period covers work of all kinds which could be accomplished before the attacking troops entered line; the second period commenced only after the arrival of such troops for their final installation.

The provisions relative to the first attack, then of the following attacks, were to be the object, in all echelons of numerous plans which were to establish every detail and were to leave nothing to chance:

- Plans of action or of engagement of large and small units;
- Plans of action of the artillery;

Plans of works to be constructed;

Plans of supply and evacuation;

Plans of liaison;

Furthermore, the employment of large units was definitely (side by side), each corps to comprise three, four and even five divisions. The augmentation of means corresponded to the necessity:

-- "to have an ample front of engagement (at least two divisions) so as appropriately to place the artillery;

-- "of having strong reserves available to reinforce and conduct the battle; and, in connection with the necessary halts, to push the attack on the successive hostile positions (1)".

On the other hand, each large unit, division, corps, army, has a definite and well defined role to play in the battle.

The division is the combat unit; the principal task of its leader is to combine the action of the infantry and artillery and to insure supply.

The corps is the attack unit; its leader decides upon the maneuver to be executed, insures continuity of direction, and puts the reserve divisions into action in accordance with a preconceived plan, which is capable of modification to meet circumstances. As soon as a breach appears in his front, he makes every effort to enlarge it as much as possible, and to exploit the first success obtained.

The army assigns the forces to the selected zones of attack in accordance with the problems of ease of advance, coordinates the action of the corps so as to secure rapid exploitation and so as to initiate the pursuit without delay.

The factors of success, of an attack were to be; good order, rapid and continuous support of the infantry by the artillery. All echelons were urged to maintain order in the attacking troops as the battle progressed and to constantly reconstitute reserves.

Finally the principle was accepted that units should not be left in first line until they were completely exhausted; but, on the contrary, that they should be relieved before they should have used up all their offensive power.

The instruction of 8 January defined the characteristics of the infantry in an entirely new way, the result of experience gained in position warfare and of the reorganization of the infantry as a function of the new armament.

"The infantry contains within itself no offensive power against obstacles defended by fire and provided with accessory defenses. Battle is not waged with men against materiel;

"The infantry has great capacity for the occupation of terrain;

"It is used up rapidly in battle;

"It should not maneuver in dense formations;

"Finally, its morale is extremely sensitive."

These observations marked great progress in the use of infantry, which from now on was still more to be economized. Furthermore, the role of the ar-

- (1) The infantry divisions were still engaged on narrow front, varying between 1500 and 2500 meters instead of from 1000 to 1200 meters indicated by the Instruction of 16 April, 1915.

tillery, continuously increasing in importance, the amount of infantry to be used in an attack may be sensibly decreased; on the other hand, the assault formation was to be thinned out, so as to decrease vulnerability; the skirmish line, instead of being formed elbow to elbow, was to be formed with two place intervals between men. The fire capacity of the line was not to be decreased by this procedure, for the infantry was now provided with numerous machine guns and was about to receive machine rifles; the tendency was to replace, by degrees, men by machines, to a certain extent.

The artillery "by a systematic fire on the enemy's successive lines, was to destroy his accessory defenses, tear up his shelters, his communication trenches and his flanking organizations; by repeated blows it will reduce the enemy's morale; it will be prepared to support effectively the infantry attacks as they advance. Light artillery and particularly heavy artillery will undertake desperate battle against the hostile artillery, which will include adjustment and minute observation, and which will have for its object the destruction of the hostile artillery."

All the artillery which is to be used in the destruction of hostile organization will be at the disposition of the division commanders. Counter-battery will be executed partly by division artillery, and beyond a fixed limit, by corps artillery.

The artillery was about to use toxic gas shell. At this time their use was to be limited during the execution of attacks to an attempt at neutralization, of hostile batteries which could not be destroyed by precision fire during the preparation.

A large part of the artillery was to be pushed as far to the front as possible so that they could initially fire on "not only the first line, but the general position, the second position, whenever possible, and also counter-battery hostile batteries which were often placed well to the rear".

Lastly, although displacements during the course of the attack were contemplated, only those which might be absolutely necessary were to be executed. In order to avoid the interruption of fire which might result from such displacements, the first batteries to be moved were to be those of the second line divisions, although, in principle, these latter should retain all their artillery. In practice, the displacement of artillery, to execute the new dispositions to be taken up, were made during the halts which separated two successive attacks; halts which were to be made as short as possible by the plans made in advance.

The three instructions of January, 1916, naturally had the case of the offensive on the French front in mind; that is to say, against deliberately organized positions which were echeloned in depth. Like those which followed them, they were, therefore, not of a general character which might be applicable to different forms of war; for example, to open warfare. They determined the procedure to be used to force in or break the fortified German front, as it existed in France at that time; and they did not contemplate any other situation. This remark is not out of place; for at times an attempt has been made to generalize the prescriptions contained therein.

Along with the Instructions of January 1916, order and method assumed the ascendancy over rapidity and continuity; echeloning of positions in depth forced the decomposition of offensive action into successive attacks with limited objectives; on the other hand, the strengthening of these organizations led to consider the total destruction of the obstacles, which opposed the advance of the infantry as being absolutely necessary, and that necessity induced the use of artillery materiel which constantly increased in number and power (1), and an enormous expenditure of ammunition.

(1) Hence the first construction program of heavy, rapid fire artillery materiel dated 30 May, 1916.

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It was a question of economizing in infantry which has been sorely tried in 1915 (350,000 killed or missing); from this consideration there sprang a number of formulae which were the result of experience, and which were to form the basis of new procedure;

The infantry is not capable of offensive action without the assistance of artillery;

The artillery crushes, the infantry swoops over;

Battle is not waged with men against materiel;

For the infantry in battle, order takes precedent over rapidity.

These offensive procedures, doubtless, were to add more method and order, but ~~also~~ less speed to the execution of operations. In siege warfare, properly ~~so~~ called, this slowness is only of relative importance because the garrison of the place cannot be reinforced and because the depth of the organizations to be conquered is limited; but conditions are not the same in field warfare. That slowness is like to compromise the first successes obtained by permitting the enemy "to become reestablished in a stable and orderly situation". It is not enough to say, like the Instruction of 26 January, that "it is by the untiring activity of every echelon that readiness is attained to attack before the enemy may be able to collect himself", further the means to reduce the interval of time between two successive attacks should be indicated. Here was the whole difficulty; and, until the end of the war, we were to continue to seek the means of reconciling these two contradictory conditions which had already been established.

Necessity of obtaining rapidity and continuity in attacks in order to prevent the enemy from reorganizing.

Necessity of halts in order to allow the artillery to move up to execute a new preparation (necessity of method).

Thus we see the reappearance of the importance of the factor time, which, equally with surprise and preparation, is one of the essential conditions for success. Unhappily, our heavy artillery materiel was still not sufficiently perfected to permit either rapid displacements in torn up terrain, or of a short preparation. Also, the idea of continuity in attacks was incompatible with the requirement for a really effective artillery preparation; that is why it was sacrificed in the Instruction of 16 January, 1916.

This slowness in the execution of offensive operations was to be found also in the preparation of attacks. The command could still not count upon the early completion of the offensive preparation of the ground on certain parts of the front, as it has prescribed at the end of 1915. Thus, it foresaw that the preparation of an offensive action would include the two periods which we mentioned further back, and which would require, as formerly, very much time, particularly the first period.

110) On the other hand, the drawing up, then the approval of the numerous plans which had to be established for an offensive, in themselves, would require quite long delays.

It seems as though we were acting as though we had in front of us an enemy who had been struck by passivity, or at any rate, one who would remain blind to all our preparations for attack; and thus the methods which we used against him excluded all strategic surprise.

Furthermore, like those which preceded them, the new Instructions did not seem to attach any particular importance to that question. They reproduced that prescription, already known, that the "Command has the duty of assuring the secrecy of operations and to secure the advantage of surprise by all possible precautions; but that is as far as they go.

In Instruction of 8 January alone, speaking of principles to be used by small units, specifies that "surprise should be sought; this requires secrecy of preparation and speed in execution. The maximum result is secure when the strength of the attack is directed at enemy weakness, and when he has not the time to make dispositions to parry it." That is an excellent principle, which, unhappily, the Instructions of January, 1916, did not provide the means to put into practice. As in 1915, in such operations, only tactical surprise could be attempted.

(111) The obligation of establishing numerous plans, of which we have already spoken, marked a new tendency which was only to be accentuated as the war went on; and which resulted in habits which became established in this period of stabilization. The command, which could quickly get information on everything which was going on, tended towards excessive centralization; nothing could no longer be done excepting upon its orders; it took over all initiative and all responsibility. The practice of position warfare having demonstrated that there could never be too much foresight, led to advance regulation of every detail of an operation by the establishment of plans which were only to be put in effect after receipt of approval of higher headquarters, inclusive of corps and sometimes even of army (1). The maneuver to be executed was minutely laid down therein; each unit had its role to play, from which it could not deviate; the scenario was fully set up in every detail attempting to eliminate all contingencies from the battle, and suppressing that initiative of executives, which circumstances offers to them in spite of any such action, and which had produced such great results in open warfare. This action, which had its advantages in the special case of successive attacks with in organized positions, could not be justified, we shall see later, during the period of the exploitation of success. Be that as it may, our corps of officers and noncommissioned officers lost in that school the taste for initiative and responsibility; a grave disadvantage, the result of which were to make themselves cruelly felt later, when we again had to operate in open warfare.

(112) Thus offensive operations were from now on to take on a methodical and orderly character, which differentiates them in an essential manner from those which preceded them. In spite of slowness which they were to result in we hoped to accomplish the dislocation of the fortified front. The Instruction of 16 January stated: "The executives should be convinced that battle against a fortified position can and should conclude in victory provided that the battle be if it is undertaken with materiel and moral superiority, conducted with vigor, method and tenacity and that it continue as long as the enemy opposes us with positions which he may have previously fortified or not. Then there was to commence the phase of exploitation of success, about which the Instructions of January, 1916 were rather vague. Practically, only the role of the cavalry is therein contemplated; the action of large units was to be controlled and combined by corps and army commanders, but the question was still not well defined, and we had to wait for the Instruction of 16 December for definite ideas on the part to be played by large units in tactical and strategic exploitation. It was well understood that during the course of the battle every partial success should be immediately exploited by all echelons. The Instructions of 26 January said: "Attempts should not be made to push partially disorganized troops, susceptible to breaking under counterattack, too far into hostile territory; neither must there be too much timidity and thus miss favorable opportunities." However, the Instruction rather contemplated the situation where the enemy would resist indefinitely, so to speak, in his fortified positions, and from this idea they deduced a method of methodically running him off by perfectly arranged successive attacks. There was practically no provision for exploiting the favorable opportunity which would arise if a part of the enemy's carefully erected system suddenly caved in; in such case improvisation would have to be resorted to, that is to say, use initiative, and we know that the method of command then in use did not encourage executives in that direction. In a word, forbidding the infantry to pass a previously designated objective, was to forbid it from exploiting its successes.

- (1) We must state that in addition to the necessity for very full foresight, the introduction of new weapons and the lack of instruction of troops were to lead the command to mix up in many details, which are not normally within its province.

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Thus the old theory of the inviolability of fronts reappeared, but this time under a more mitigated form; impossibility of breaking through the fortified positions in one effort; but hope of making them fall by the repeated blow of successive attacks. Nevertheless, the result was the confidence in the results of brutal action, which any attack is, was shaken no matter how slightly; it was noted that before the penetration could be produced a certain amount of fighting had to take place; whence the nations of long offensive operations and of the preliminary usure of the enemy.

But this theory of the inviolability of fronts did not appeal to all minds in the form we have just indicated. Some were already beginning to think that the employment of fortifications gives such strength to positions, that it is difficult, if not impossible, to take them by frontal attacks, no matter how powerful such attacks may be; and these were not far from concluding that the defensive was superior to the offensive. Although the defensive did not produce immediate and decisive results against the enemy, nevertheless, thanks to defensive tactics, the enemy's offensive projects could be broken up and he could be used up; finally, it was thought that such means would economize our forces and gain time; all of which ideas were false, as coming events were not slow in demonstrating.

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In closing this analysis of the new Instructions we shall note that they very properly called everybody's attention to the necessity for cultivating and exalting the morale of the troops. In this war which threatened to last a long time. The first quality to be developed is energy. The Instruction of 5 January said: "Energy is the basis of every military art; it is developed by effort. It gives lift to the military virtues; bravery, discipline, spirit of sacrifice, solidarity; energy provides the necessary ardor and tenacity to fight to the finish in any form of battle (offensive or defensive)." This was to be the leader's duty in all his daily activity; he was to redouble his activity in this direction whenever an offensive might be projected, for "the preparation of an operation is not only material but more, and above all, moral". This recognized preparation was confided to all leaders and particularly to the division commander; they were to get in touch with their men, and establish frequent association between infantrymen and artillerymen, as well as between commanders of neighboring units. Thus by personal and daily action they were to produce an unshakable confidence in success, and insure that union of arms which is indispensable on the battle field.

2. -- The State of mind at the beginning of 1916. -- What we have just said in the subject of offensive methods is only a reflection of the state of mind which existed at that time. The lack of success of the offensives of 1915 resulted in a weakening of faith in the success of a violent and brutal effort against strongly organized positions defended by an enemy, who did not appear to be weakened or demoralized, as had been hoped. Only successive attacks, having sharply defined objectives, such as the Germans had made on our front (Argonne for example), seemed to be able to succeed, without causing great losses to the infantry. The sentiment of the infantry was that, up to this time, it had been somewhat sacrificed; and it accepted with satisfaction the idea that from now on the artillery would tear up and destroy all the obstacles which might stop its advance, and that it would not deliver the assault until after witnessing that their destructions were effectively realized.

The artillery crushes, the infantry sweeps over, and already some began to translate this into: the artillery conquers the terrain, the infantry occupies it. Important when confronted by the obstacles of fortifications, the infantry was to cede the principal role to the artillery, which alone was able to tear up these obstacles. If this theory, which already had its adherents, was applicable to siege warfare proper, it was not wise either to exaggerate it, or, above all to make it of general application. The infantry remained, and was to remain until the end of the war, the only arm which could conquer, occupy and hold terrain, in position warfare. All that can be said on the subject is, that the greater the difficulties which it has to overcome, the more indispensable too is the assistance of the other arms, particularly that of the artillery.

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Many thought that infinitely less casualties were suffered in the defensive than in the offensive; the experience of Verdun, then of the Somme, and finally the operations of 1918 are to furnish irrefutable proof of the contrary.

Others had the idea that this war, which had now lasted only eighteen months could not be brought to a satisfactory end by arms alone, and that financial and economic exhaustion of the enemy was alone capable of bringing about a decision (1). It was, therefore, a question of holding on, for time was working for us; an ill-omened theory, whose first and most serious consequence is to chill courage and to cause a let down in energy, which up to this point had been directed solely against the enemy; equally a fast theory which ran the risk of leading the country to its ruin, because it did not consider unexpected, but always possible events, like the Russian defection, for example, which was luckily balanced for us by the American intervention.

(115) To sum up, although these ideas were still but slightly disseminated, it is important to note that their appearance from this period on, for they did not fail to exercise an influence to some extent upon the state of mind of the combatant, particularly in the infantry. The infantryman, while still maintaining a high morale, as he will so eloquently show at Verdun and on the Somme, was very willing to cede to the artilleryman the preponderant role, which he himself had played in battle up to this point. It is true to say that this was a necessity, but it was only a momentary necessity, which should not rob him of his self confidence, of his ardor, in a word, of his offensive spirit. This trench warfare was siege warfare, with those particularities we were familiar; but there was to come a time when we would get away from the trenches again, to take up the habits of battle in open terrain, in which the infantry, occupying the dominant role, would have to show itself as ardent as in the past. And not enough was said of this idea, and doubtless this was because we were not firmly convinced of this inevitable return to open warfare.

3. -- The German offensive against Verdun. -- a. -- Purpose of the German offensive against Verdun. -- For some time it was believed in France that the Germans had chosen the Verdun front for the purpose of attempting a break through there similar to the attempts which we made in 1915. Nothing is more false; to be convinced of this we have only to consult the Memorandum which General von Falkenhayn, chief of staff at German General Headquarters, wrote about Christmas 1915, proposing that offensive to the Emperor.

- Summing up the different capabilities of the Entente, Falkenhayn estimated that "France is militarily and economically weakened, almost to the limit of her ability. France was the sword of England, who remains the principle enemy and from who all hope must be taken of bringing Germany to terms by a war of attrition. It would be better, therefore, to attack the English front, but this would require that at least thirty divisions be available, which could not be collected without greatly endangering other parts of the front. Also it was better to strike at England by putting France out of the war.

"If we manage to make her people clearly understand that there is no further hope in her military situation, the limit (of her forces) will be exceeded and England will see herself deprived of her best sword. The break through executed by masses, a doubtful operation and which is beyond our forces, is not necessary to obtain this result (2). Even by employing limited effectives,

(1) But, according to Clausewitz, war is governed by a single supreme law, decision of arms.

(2) In fact Falkenhayn did not have enough troops to attempt it against an enemy whose morale was intact, whose armament was good and who was not markedly inferior in numbers. Under such circumstances, he believed that the defender would succeed in closing the breaches which might have been made on his front; and in attempting a break through he would only succeed in creating pockets which would be very much exposed to effects of fire from the flank, and which would then threaten to become the graves of a mass of troops. The technical difficulties presented by handling and supplying large masses in such concurred pockets, become nearly insurmountable.....".

It will be remembered that analogous conclusions were drawn from the battle of Perthes (February - March, 1915); Ludendorff does not seem to have taken account of this in his offensive of 1918.

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objective can apparently be attained". For this it would be enough to find some sharply defined objective, within accessible distance, for the preservation of which the French Command is forced to use up to its last man. If it reacts in this way, the French troops will be exhausted by their bloody losses, for it will be impossible for them to avoid battle, whether we attain our objective or not. If the French Command does not take this action and allow the objective to fall into our hands, the moral effect produced in France will be enormous."

After having rejected Belfort as an objective, Falkenhayn preferred Verdun, whose advanced lines menaced the German communication at less than 20 kilometers, and which was still the most powerful strong point capable of serving as a base of departure for an offensive which would be troublesome for the German front. Lastly, as General Mangin says, "Verdun has always exercised a singular fascination upon German imagination, and its capture, which seemed relatively easy, could in itself be celebrated as a great victory in Germany and in neutral countries." (1)

Thus, the operation against Verdun was decided upon in order to put France out of action, who, Falkenhayn believed to be about to reach the limit of her resisting powers. It was to be conducted upon a limited front, with relatively weak forces, but in a methodical way. There was no idea of a break through or of exploitation of success. The idea in taking the initiative in operations was to force the French army to fight, to exhaust its reserves, to effect its morale and to prevent it from participating in any new offensive; by this means England alone, or practically so, was to be at the mercy of the Germans.

It was on Christmas night that the selection of Verdun was ratified by the Emperor. Falkenhayn did not suspect that he was thus to give the French Army the opportunity of adding one of the most beautiful pages to its history, already so glorious.

b. The defensive organization of Verdun. -- The relatively rapid fall of the Belgian fortresses, and of certain of our own, early in hostilities, as well as the exaggerated destructive powers attributed to the enemy's large caliber shells, had caused many minds to doubt the capacity of resistance of our fortified works. Under the idea that they would be torn up and made absolutely useless under the effect of large projectiles, it was decided to move the defense of our fortified places very far to the front of the permanent works, so as to keep the latter out of range of the German long range artillery and to postpone the occurrence of a siege which could not hold out long. This was why, the infantry garrisons of the forts were done away with; nobody was left in them but the necessary personnel to serve the turreted guns.

On the other hand, the fortified place of Verdun, like Belfort and Dunkirk, had been transferred into fortified regions, it thus lost its independent character. A decree of 5 August, 1915 stipulated that the governors of fortified regions located within the zone of the armies, with their garrisons, and resources in war material and food stuffs, should pass under the orders of the Commander-in-Chief.

As was said with reference to the lessons on the defensive drawn from the offensive of 9 May, 1915, the Verdun front had been organized into centers of resistance, each of which has more or less a closed work, and which were separated from one another by passive zones which were more or less swept by fire.

The distance between two centers was sometimes rather great. (2) Movements were made through the woods or under shelter of artificial hedges.

(1) Ludendorff, who, however, was not a partisan of the offensive, wrote: "The fortress of Verdun was an outlet gate which was extremely dangerous for us and which very seriously menaced our communications, as was to be well demonstrated in the autumn of 1918."

(2) One kilometer between the centers Bethincourt and the Berges;
One kilometer between the Bois des Soures and the _____.

In rear of the first line as thus constituted, within a zone of from two to three kilometers, a certain number of villages, woods, heights (plateau of Caurieres, Bois de Warville, Beaumont, le Mort-Homme, Cumieres, etc) had been organized into centers.

Although progressing, that precarious organization was far from being completed at the beginning of 1916; this was principally due to lack of labor. Since the battle of the Marne, the sector of Verdun had been constantly lightly held, partly by territorial units; however, indices of attack beginning to appear, the High Command had authorized the use of two additional divisions, beginning 10 February, 1916, to hasten the work, but they did not have time to materially better the situation, which was, unhappily, too favorable to the Falkenhayn plan.

c. The preparations for attack and the tactics employed by the Germans.
-- From the beginning of January, 1916, airplane photographs indicated considerable activity on the enemy's side; there were noted:

On the one hand, that all the armies were reinforcing their defensive organizations (1st, 2d and 3d positions);

On the other hand, that the part of the front included between the Aisne (Caronne) and the Meuse (Saint Mihiel) was changing with a view to offensive action; new railroads, ammunition depots, battery positions and heavy shelters were discovered there.

But the Germans were striving, above all, for surprise; thus they were to keep us uncertain as to the front assigned for the attack until the last moment, Champagne or Lorraine. Furthermore, they took care not to push out their parallels of departure, as was always done, to assault distance from our first lines (on some parts of the front the German trenches remained from 600 to 800 meters from our own); thus we were waiting for these last minute preparations to conclude as to the imminence of attack. (1)

Besides all the preparations were to be carefully camouflaged. Lastly, the hostile artillery had strict orders not to reply to our bombardment, no matter how violent it might be; these orders were strictly obeyed. So much for strategic surprise.

Tactical surprise was to be obtained, first, by the power and rapidity of the artillery preparation (2,000 pieces firing for nine and a half hours);

-- on the other hand, by the extent of front bombarded (22 kilometers), which would leave the enemy undecided as to the real zone of attack, which was but 7 kilometers;

-- finally, by the brutality of the infantry assault, which was not to give the enemy time to emerge from his shelters.

We know that the tactics used by the artillery as well as by the infantry was not designed to produce the break-through. On the contrary, the procedure to be adopted was designed for the methodical taking of a well defined band of hostile positions (2), while at the same time endeavoring to cause

- (1) An Instruction of the 10th Bavarian Division, dated 11 May, 1916, said: "The construction of special assault positions are not necessary; such positions serve only to attract the attention of the adversary, and it is impossible, in a very short time, to fortify them sufficiently to give troops protection from a systematic bombardment."
- (2) A note of the 20th Bavarian Brigade, dated 11 May, 1916, said: "The general problem is to take a portion of his battle line; that is, three successive trenches; but it is impossible to reach the second hostile position in the course of the same attack. For this result the artillery must first deliver a new and careful preparation of the assault; that is, to say, a new attack must be prepared and delivered." In addition, the Germans had pushed their artillery as far forward as possible for the attack of 21 February. The infantry was thus able to profit of the support of nearly all their batteries until it reached the line attained on 23 February (slopes of Talou, Louvemong, Douaumont); that is, over an average depth of 6 kilometers from its departure trenches.

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the enemy the maximum losses and effecting the economy in effectives themselves. This result was to be produced by strictly limited objective attacks, conducted with a maximum of artillery and a minimum of infantry, and in which every soldier knew the maneuver to be executed. The practical means to be used to shorten artillery preparations, by increasing the number of batteries in action, had been worked out by experiments in local operations in Champagne (Tahure, 6-12 January, 1916), in Flanders (Nieupoort and Betsass, 24 January), in Artois (Thelus and Civenchy, 23-28 January), in Picardy (Firse, 29 January) and in Alsace (Soppels, 13 February).

The employment of the artillery, which we know included a high proportion of heavy, rapid fire artillery, was to be as follows:

Bombardment over a wide front and to a great depth; after several hours, increased intensity on the points to be attacked, without letting up on the others; after the assault, fire to continue in rear and on the flanks of the area attacked. At the same time, or usually a few hours after, new concentration on another point of the front under bombardment, then delivery of the attack on that point.

On the actual front of attack, all calibers were to be used on the infantry trenches, including first line trenches, fires in depth to box in the first and second positions, but these were to be zone fires with small jumps in firing data rather than adjusted precision fires, even on enemy battery positions (1); particularly during attack, the object of counterbattery was to be, not the destruction, but the neutralization of the hostile artillery by fires of asphyxiating and lachrymatory shells, so as to interfere with the personnel in the service of the pieces.

The infantry was to engage only the effectives strictly necessary to obtain the result aimed at. A unit of the 10th Bavarian Division, dated 11 May, 1916, said: "The mission of an infantry unit in the attack is generally as follows: to seize a part of the hostile fortified organizations on a front and to a depth which has been delimited in advance; and then to hold it against intense artillery fire, and resist hostile counterattacks. To accomplish this mission, the attacking infantry should be greatly echeloned in depth. An advance beyond the point designated before the attack is justified only in special cases. Elements of the new position which progress too far beyond the general line of the position, draw hostile artillery fire and counterattacks upon themselves, and may readily inaugurate a retreat (2).

The German divisions generally attacked on a narrower front than did our divisions (1000 to 1200 meters as compared with 1500 to 2500 meters). This is explained by the smaller German companies, which had less fire power; by the deduction, by the Germans, of detachments which did not take part in the action (labor parties, carries); finally, by the sustained nature of the ef-

(1) It was thus that one battery of 155 Howitzers, located forward of Recicourt was the target, in one day, for 2000 projectiles of 210 caliber.

(2) The same Instruction stated: "The attack in position warfare particularly as it is conducted on the Verdun front, consists, essentially, in an effort at the penetration of a zone of fortification echeloned in depth, a penetration which is made by degrees, in accordance with a plan and after a minute preparation." And the note of the 20th Bavarian Brigade adds: "It is possible that the enemy situation may be such as to permit the attack to be continued beyond the line which has been designated, and to capture certain points which the subordinate command may consider of secondary importance. Do not forget that our artillery will not be in condition, if progress is made beyond the designated line, to immediately execute a new preparation and to quickly support the operation..... The decision made by a subordinate commander to extend the attack beyond the designated objective is a very serious one and should be the exception. Furthermore, the responsibility of the leader is affected, if a position which has been thus taken, be retaken by the enemy, even though the adversary thus gain only a moral success."

fort required. (1)

Attacking units were to attempt to maneuver about our centers of resistance, by turning them by infiltration through defiladed zones or zones which were thereby fired on, so as to take them in flank and in reverse. In the same way, a position was to be taken by first getting a foothold at two or several points by local attacks; then by attacking the intervals from the front and flank, using the points already captured as bases from which flank attacks were to be made.

Delivery of the attack was to be preceded by reconnaissance in force by officers (50 men, 2 officers) whose mission was to be to determine whether or not the artillery preparation had been sufficient.. (2)

In any case, and no matter how distant the departure trenches may be, the attack should not be launched until the position to be taken has been rendered impotent by the bombardment. In fact, the German Command had promised the infantry that all they would have to do would be to take possession of the conquered terrain "at parade stop" and, in fact the German infantry at certain points could emerge from their trenches with their rifles slung.

The operation, provided the artillery in such luxury as had been heretofore unknown, was organized with perfect method, truly "Germanic". It must be admitted that the procedure used by our adversaries to take the fortress of Verdun and to wear out the French Army were logical, since it corresponded with the purpose in view; however, it was not without certain disadvantages.

Surprise having been sought by every means then known, it is astonishing that no dispositions were contemplated to exploit its effects, except that of permitting the assailant to seize the hostile defenseless position. The attack was to be organized with such regularity, the combination of artillery fires with the progress of the infantry was to be so minutely regulated, the conduct of each individual in the whole was so rigorously provided for that it is impossible to make the slightest modification in this rigid mechanism without causing general confusion. Not the slightest place was left for the unforeseen, which nevertheless plays an important part in battle. If the unforeseen gives rise to some favorable events, if on account of premature use or of some blunder of the enemy, a breach appears, the Germans will be incapable of taking advantage of the propitious and always fleeting occasion; that is to say, the exploitation of success due to surprise and also to the effects of the bombardment was to be completely neglected.

The use of the artillery was to be governed accordingly. In order to obtain this much sought-after surprise, preliminary adjustment, which attracts the enemy's attention, are to be omitted; and the length of the artillery preparation is to be reduced to a few hours by making use of the maximum rate of fire of the materiel. Under these conditions, the artillery fires (except those which can be adjusted from terrestrial observation or by airplane during the progress of the preparation proper) are to be zone fires with small jumps on visible and very important objectives (hammering fire (3)), and with jumps on assumed emplacements of our batteries and reserves; effect is to be produced by concentrations, which is the only way of remedying the deficiency in adjustment; but such fires will cause an enormous ammunition expenditure, which can last only for a time.

(1) However, divisions were engaged on fronts as wide as 500 meters when their penetration required was not very deep. Note the tendency to reduce the density of the firing line, the interval between men being at least 4 meters.

(2) "To determine whether a position is ripe for the assault, intervals of time spaces must be left in the last fire for effects, reconnaissances are conducted in these openings". (Note of the 10th Bavarian Division.) "The Infantry should blame nobody but itself if the hostile position has been effectively and completely bombarded." (Note of the 20th Bavarian Brigade.)

(3) Pillonago.

Thus, hostile and neutralization of the sufficiency against casemated positions, which results in the reverse slope results.

To sum up of all calculations, huge experience of infiltration, standing limit must be, therefore, to draw the moral, bombardments, out possibilities, thus devastate.

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Thus, while our counterbatteries were directed at the destruction of the hostile artillery by fires of precision, the Germans only sought their neutralization, either by high explosive shell or toxic shell (first lacrymators, the suffocants, beginning 23 June). These fires were practically without effect against our sheltered batteries but they were effective against our non-casemated reinforcing batteries; their effect on our organizations was considerable when the enemy had direct observation, mediocre when we were on the reverse slopes. In any event it required a very debauch of projectiles to get results.

To sum up this method, based on surprise and the use in mass of artillery of all calibers, allows economy of infantry effectives, but it results in a large expenditure of ammunition. In order to reduce the unforeseen contingencies of infantry combat to a minimum, it regulates all the details of the operation, in nearly an invariable manner; and, in order to attain perfect understanding between the action of the infantry and the action of the artillery, a limit must be made voluntarily upon the results to be attained. This method is, therefore, too rigid, because it does not permit all the possible profit to be drawn from successes which have been attained. (1) On the other hand, the moral effect and the physical shock produced by such truly formidable bombardments, the losses which suddenly reduce the strength of the defense without possibility of reinforcement, make the conquest of the zone of terrain thus devastated almost absolutely certain.

d. Review of the battle of Verdun. -- The French High Command, not being able to tell whether the German offensive would take place in Champagne or Lorraine, had not reinforced the effectives in the fortified region of Verdun, which comprised only nine infantry divisions and six heavy artillery regiments divided between both sides of the Meuse (a total of 612 pieces, of which 244 were heavy). However, from the first days of February, it had assembled for any eventuality in rear of that front an army of four corps with a certain amount of heavy artillery.

Our units in line were to have to deal with seventeen and shortly with nineteen German divisions supported by 2000 guns, of which a large proportion were large caliber.

From our point of view, the battle of Verdun may be divided into two distinct phases: the defensive battle, properly so called, a step by step battle, in which we replied to the enemy's attacks by our counterattacks. These were often victorious, but did not succeed in definitely stopping his advance or in retaking the initiative in operations. The second phase began when the Somme offensive forced the Germans to stop their attempts on Verdun; the French retook the initiative of operations and delivered several attacks, which restored to us a large portion of the lost ground and disengaged the fortress.

(1) The defensive battle. -- It started with the sudden attack of 21 February. (2)

The bombardment started on both sides of the Meuse along a 22 kilometer front at 7:15 AM. At 4:45 PM, that is to say, after a preparation of nine hours and a half, the infantry attack was launched on the right bank on a front of only seven kilometers, between the Bois des Caures and Herbebois; seven German divisions took part, five of which were in the first line, which, for five days, had only two French divisions, very much reduced by the effects of the bombardment, in their front. In spite of surprise and the disproportion of forces, the Germans encountered an unexpected resistance but one which was localized. After an advance of from 6 to 7 kilometers on the fourth day the attack lost its impetus, while on this same day, 24 February, the favorable

(1) Analogous observations were made with reference to the offensive method which resulted from our Instruction of January, 1916.

(2) This attack was originally to have been made on 13 February; it was postponed to the 21st because of bad weather.

situation occurred which the Germans did not know how to take advantage of. On the 26th, Fort Douaumont, whose sole garrison was twenty-three gunners, well as the work of Hardaumont, fell into the Germans' hands.

The situation was critical; from the 24th it had been necessary to draw back the troops who were occupying the Woivre to the Heights of the Meuse; on the 26th General Petain took command of the Army of Verdun and organized the defense with the reinforcements which were arriving. Although the battle had not stopped a single day, our front began to become established, the enemy's dash had been broken by our counterattacks to such an extent that at the beginning of March this first attack could be considered to have been hemmed in.

It was then that the Crown Prince took up the continuation of the offensive on both banks of the Meuse. On 6 March, after a two days' bombardment he launched two divisions on a front of four kilometers against our positions on the left bank, between Maulin de Raffecourt and the Meuse; but our troops were on guard and the attack advanced only two kilometers. Judging these results to be sufficient; the Crown Prince had the offensive on the right bank resumed between the Poivre hill and Fort de Vaux (a front of eight kilometers) by seven reconstituted divisions, of whom he demanded a supreme effort to take Verdun, the heart of France. On 8 March, we were then attacked on both banks; after three days of battle, progress was insignificant; Poivre hill (right bank) and Mort-Homme (left bank) remained in our hands.

Then began a veritable battle of usure in which the enemy could not deliver an attack without being immediately subjected to a counterattack. In spite of our efforts, Mort-Homme was lost, Fort Souville menaced for a time, and Fort Douaumont could not be retaken. After the capture of Cumieros (24 May), the enemy suspended his attempts on the left bank to concentrate his efforts on the right bank. During the course of June, he delivered no less than eight attacks on the front: Thiaucourt Farm--Damloup, managed to capture Fort Vaux (7 June) and again threatened Fort Souville. As General Mangin wrote: "The heroism of the French soldier seemed to be impotent against this sort of mechanical advance."

It was at this time that General Petain took command of the Army Group of the Center and was replaced by General Nivelle.

We now come to the phase of the last German attempts at the offensive. Weary of battle whose success was not to their liking, and which was neither rapid enough nor extended enough, and feeling also the threat of the offensive on the Somme approaching, they decided to have done with the affair by a vast operation on the right bank, which was to have been the finishing blow to the French Army. The German Command counted on being able to push its battalions with their flags at their heads, in the walls of Verdun, in two or three days at the most, and to drive the French to the Meuse. Nineteen regiments were assigned to the attack, of which twelve were in the first line, on a front of six kilometers, outlined by Bois de Nave, Fleury, Bois de Vaux and Damloup; the reinforcements and reserves were very close to the first waves in order to take advantage of initial success and to assure continuity of effort. General Mangin says: "It was the most important and most massive attack which Verdun had to withstand." After an intense artillery preparation which lasted three days, on 23 June the attack was launched against our positions which had been literally levelled and which were almost devoid of defenders, but the hostile disposition, very much jammed up on its forward elements, suffered from our artillery fire; and almost from the beginning of the attack, the reinforcements jammed up and became confused with the front line. After having penetrated to the works of Froide-Terre, the assailant was pushed back by our counterattacks which retook the works of Thiaumont and Fleury (27 June). After four days of terrific fighting, the offensive of 23 June was definitely hemmed in.

But, not abandoning his idea of taking Verdun, and also in answer to our offensive on the Somme, on 11 July the Crown Prince attempted a third heavy attack with thirteen regiments supported by 600 batteries on practically the same front as that of 23 June. After an artillery preparation of two and a half days, the attack, at a single bound, reached Chapelle Sainte-Fine and

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Pourdriore; that is to say, within two and a half kilometers of Verdun, where it was again repulsed by our counterattacks; and greater still, under the energetic impulsion of General Mangin, who had taken command of this sector, the enemy was forced to face our attacks and was pushed back to his position of departure (20 July).

(2) The offensive operations. -- From 1 March, the Commander-in-Chief had written to General Petain: "It is of the utmost importance that you initiate offensive actions, with definite ends in view." But the enemy's powerful and incessant attacks up to now had allowed us only to limit his advance by the equally incessant action of our counterattacks. Now offensive action was to be possible from a material point of view, for the Germans had been forced to start their reserves and part of their artillery towards the battlefields of the Somme; as well as from a morale point of view, for their troops were beginning to feel their inability of reaching the objective which had been assigned to them for five months.

However, the Crown Prince was still not willing to stop, twice, 3 August and 3 September, he started fresh attacks towards Fort Souville. We replied with a series of counterattacks and local actions which pushed him beyond Fleury and to the entrances of Fort Vaux.

Then, as General Mangin says: "The battle then came to a lull on the right bank. The time for attacks which had involved only the retaking of a few hundred meters of terrain had gone; they had permitted us to successively reduce the pockets which the Germans had pushed into our line; but now the only profitable way in which to gain terrain was to carry the whole line forward at a single bound.

"An operation on a large scale was now required. The purpose now became to reconstitute the integrity of the barrier of the forts of Verdun." This was also the time (29 August) when Falkenhayn, who had produced no decisive results at Verdun and who had not been able to prevent the Somme offensive, was replaced by the Hindenburg-Ludendorff combination, whose first action was to order the suspension of the operations against Verdun.

On 21 September the Commander of the Second Army decided to operate on a broader front and to retake Fort Douaumont. This mission was confided to the Mangin groupement which was to attack with three divisions in first line (1), three divisions in second line and two divisions in reserve, on a front of about eight kilometers, between the quarries of Houdraumont and the works of Laucourt. The operation was to be prepared and supported by nearly 650 guns, of which 400 were heavy artillery. It was to consist of two phases, separated by a halt; its objectives were limited and were, on an average, two kilometers away.

The German Command was not expecting an offensive on a large scale; it hardly expected anything beyond local attacks for the purpose of holding the maximum number of troops on the Verdun front. It had in line on the front of attack seven divisions, holding narrow fronts and greatly echeloned in depth. The artillery capable of coming into action on this front was still powerful; more than two hundred batteries, or about 800 pieces. It is thus apparent, that though the infantry was nearly equivalent on the two sides, the German artillery which was available was very much superior to ours.

The artillery preparation commenced 20 October and lasted until 11:40 AM on the 24th, that is, four and a half days. Not only were the organizations, which were to be taken, levelled, but the reinforcements and reserves were dispersed by the bombardment and ceased to be available for the defense. Furthermore, the first line battalion suffered such heavy losses that from the 23d nearly all of them had to be relieved. The hostile artillery was so heavily counterbattered or neutralized (2) that our own remained practically master of its fires.

(1) Supported by one infantry regiment of the divisions on each flank.

(2) Of the number of batteries which were counterbattered (about 100) 30% seem to have been put out of commission; and of those which were the object of neutralization, 40% were silenced.

The infantry, by practicing its attacks and by the solicitude for its morale, had been well prepared. It launched the assault on 24 October amidst a heavy fog. In less than one hour the first objectives were carried, including Fort Douaumont which had been evacuated on the even of attack when an explosion was feared. Then the second objective was quickly taken, except on our right where Fort Vaux did not fall into our hands until the 26th, after the intervention of a second line division, and particularly, after a new artillery preparation.

This attack netted us 6000 prisoners, 15 guns, a great number of machine guns and trench weapons. The recapture of Forts Douaumont and Vaux, which the Germans had represented as being the keystone of Verdun, was an event of considerable importance. But this first success was not enough; the heights which provided observation into our new position, particularly Poivre Hill, had to be taken; this was the purpose of the attack of 15 December, 1916.

Between 24 October and 15 December, the Germans showed a tendency to consider the Verdun front as having become an inactive front. On 15 December only five divisions, still echeloned in depth, faced our attack; it is true that four divisions were in reserve about thirty kilometers in rear. On the other hand, there was still considerable artillery in place, 247 batteries, that is, 960 guns. Finally, the enemy had done much work and was able to oppose us with three lines of defense, the two last of which, however, had only been started.

The Mangin group was to deliver the attack on the front: Vacherauville Bois de Hardaumont, that is, ten and a half kilometers, with four divisions in first line, four in second line, supported by 760 guns, of which 390 were heavy artillery.

The infantry strength was about the same on the two sides; but, as on 24 October, we still were markedly inferior in artillery, which was happily made up for by proven methods. But the most serious obstacle was the completely torn up and soaked up condition of the ground, a veritable chaos of shell holes filled with icy water.

The artillery preparation began 10 December and lasted until 11:00 AM on the 15th, that is six and a half days. Atmospheric conditions having been unfavorable, destruction was not adequate except on the first line of defense; furthermore, the infantry had to overcome more difficult obstacles than on 24 October. While counterbattery had not been very effective against the hostile batteries, these were neutralized on the day of the attack. (1)

The infantry attack was launched at 11:00 AM, 15 December. The first objective was reached the same day; but, on account of difficulties encountered the second objective was not reached until the following days; and distant parts of the second objectives were not reached until 18 December. The German reserve divisions got up just in time to relieve the divisions in first line. The counterattack, by that time, was out of the question for them, they had to simply hold in place to save what was left of the artillery. We took 11,000 prisoners, 115 guns and more than 100 machine guns.

These two great successes were to be completed by the attack of 20 August 1917, which restored to us practically the positions which we held prior to the great German offensive of February, 1916.

e. The causes of the German repulse. -- The estimate which Falkenhayn made of the French situation at the beginning of 1916 was wrong; it was bound to result in a repulse. To engage battle with the preconceived idea that France was "militarily and economically weakened to the limit of its endurance", to accept the premise as a conclusion and was faulty reasoning. Blinded by that German pride, which was to bring the German people to their ruin, Falkenhayn went wrong by deliberately underestimating the force of his opponent, and thus exposed himself to the most serious errors.

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While, according to the very statement of its leader, the German Army could make available only 30 divisions on the western front without compromising the security of the general situation (1), the Franco-British Armies, at rest since the end of October, 1915, had taken up a disposition echeloned in depth, in which the reserves amounted to about 50 divisions. The economic situation was far from being alarming; the French government was not concerned by it until along in the winter of 1916-1917.

Such was the first cause of the German repulse at Verdun; there were others, among which must be noted the attack methods which were used: too narrow fronts, which allowed us, as soon as the slightest reinforcement arrived, to stop up the breach and to limit the withdrawal; formalism and rigidity of method, which, as we have said, precluded any possibility of exploiting success, a circumstance which was very lucky for us, for on the night of 24 February, the road to Verdun was open before the Germans, who, if they had pushed on boldly instead of voluntarily halting, would at least have gained Belleville Hill.

General Mangin wrote: "The offensive of 21 February was terrible and stingy at the same time; it was staged on too narrow a front, which while it widened out slightly, again contracted, in spite of the great array of artillery with which it was provided, and the limitless use of infantry in deep formations, it advanced only with great effort and did not know how to profit by the gaps which were in front of it on certain days. When it was decided to extend it to the left bank of the Meuse, it was too late; the defense had got a new hold on itself and had been organized."

Lastly, a third cause of the Germans repulse at Verdun must be sought in the coolness and energy of the French Command. From 24 March, when our troops fell back from the Woëvre to the heights of the Meuse, the Commander-in-Chief gave the imperative order to resist on the right bank of the Meuse and never to abandon it; on the 26th, when General Petain took command of the Army of Verdun, the same order was renewed and completed by this grave caution: "Any commander who, in the present situation, gives an order to retreat, shall be brought before a court-martial." Later, towards the middle of June, the Commander-in-Chief repeated his order to General Petain, who continued to prescribe counterattacks on counterattacks. When the situation became critical on the night of the great attack of 23 June, General Petain had all dispositions taken for the eventual evacuation of the right bank, without letting his subordinates become acquainted with the possibility of such action. General Mangin said:

"To his soldiers and their leaders he exhibited impossible countenance and continued to say: 'On les aura', while he continued to keep General Joffre acquainted with the dangers of the situation; but the latter, imperturbable, repeated on 26 June, as on the day before, that Verdun must be defended on the right bank; he went so far, in spite of the critical period, as to refuse the help of the English, wishing to keep Verdun a French battle and being convinced that it would become a French victory. The High Command thus demonstrated all the confidence which it had in its army in not wavering in the face of any of the risks or any of the responsibility which such decisions involve; and events were to show that it was to have no reason to repent its decision. It had proclaimed in its Instructions that "energy in the Basis of every military action; it gives the ardor and the tenacity necessary to fight to a finish, no matter what may be the form of the battle." It gave a striking example of its own doctrine, which from now on was to remain famous. Joseph de Maistre had already said: "A battle lost, is a battle which is believed to be lost; it is the imagination which loses battles." It is certain that that truth was never so completely verified as at Verdun. We can say then; if the French army held so courageously in the face of such desperate circumstances, it was thanks to the coolness and energy of that group of leaders who, from top to bottom of the hierarchic scale, refused even for a moment to lose hope in victory.

(1) On 21 February, the Germans had 124 divisions on the western front, of which only 19 were in reserve.

f. The results. -- However, in spite of the repulse of his effort against Verdun, did Falkenhayn gain the principal objective which he had set for himself that is, the usure of the French Army to such an extent it could not take part in the offensive on the Somme! On this point, he suffered a cruel deception.

Certainly, it would be futile to deny that the Verdun offensive had weakened our military power in any way. It is enough to note that, from February to 1 July, two-thirds of the French Army, that is, 65 divisions of 95, passed through the furnace and were cruelly tired therein; but it was not enough to crush our power; the operations of Verdun had only led to its fore. While the plan which was decided upon at Chantilly in December 1915 called for the cooperation of 39 French divisions and 1700 pieces of heavy artillery in the Somme offensive, it was possible at first to furnish only 12 divisions and 700 pieces of heavy artillery; but, from the end of August, the calmness at Verdun allowed us to put a new army of 13 divisions into the offensive and to increase the number of heavy artillery guns to 1200, while leaving about 200 in front of Verdun. Not having been able to gain rapidly the objective which had been assigned, Falkenhayn found himself tied up in a struggle which, if it was to cause the usury of his opponent, was also causing losses to the Germans which they could very poorly afford. From March to June they had great difficulty in raising the 12 to 15 divisions needed to keep the battle going; and by 1 July, the battle had already cost them some 50 divisions. In the same period, 21 February to 1 July, usure was greater, it is true, on the French side than on the German side (65 divisions against 50), that is to say, on the defending side than on the attacking side (a phenomenon which was already known and to which we shall have occasion to return); but what made matters worse for the Germans was the crisis in effectives which such usure further aggravated. After a short time, therefore, the Verdun offensive reacted against the Germans themselves: the holocaust which they lit was burning up effectives at a rate which they had not suspected; Ludendorff said: "Verdun became an open ulcer which sucked up our forces."

Furthermore, when the Somme battle started, Germany started on the critical period which she experienced at any time prior to the summer of 1918. That is where the false estimates of the High Command led Germany.

On the Allied side, the happy formula of "unity of action on a single front", laid down by the head of the French government, M. Briand, had borne its fruits. Not only had the British Army extended its front and liberated one of our armies; but further, from March, the Russians and Italians reacted to the Verdun offensive by attacks of their own. The effect of the Austrian riposte in Italy on 15 May, was only to precipitate Broussiloff's offensive of 4 June which jeopardized the whole eastern front. Lastly, Roumania did not take long in getting into action.

A comparison of the two situations was decidedly in favor of the Allies; it became more in their favor as the Somme offensive proceeded.)

4. THE ALLIED OFFENSIVE ON THE SOMME (1 JULY -- END OF NOVEMBER, 1918)
-- a. The opposing forces. -- We have seen that the usure resulting from the battle of Verdun caused considerable reduction in the French forces originally were intended for the Somme offensive. In fact, on 1 July, we could support the action of the English with only a single army (Sixth Army) consisting of three corps, that is, twelve divisions, with 700 pieces of artillery and 580 trench mortars, for a front of attack of 16 kilometers. But, little as it was in the beginning, that cooperation of the French Army exceeded the expectation of our enemies, in any event, it was the result of the tenacity of the Commander-in-Chief, who conducted the battle of Verdun as to use in it only the necessary effectives, and who was fully decided to retake the initiative of operations on the Somme when the proper time should arrive.

For a long time he had decided that this time would be the beginning of July; and nothing made him modify this date; neither the enemy's operations nor the solicitations of the Government, at least that of the English, who urged him to start the offensive much earlier.

On the other hand, the troops which were to take part in that battle, were generally of very good quality. Aside from the infantry armament, changed by the adoption of the automatic rifle and the Viven-Bessieres grenades, the Command had taken pains, as far as the battle of Verdun would permit, to put these troops through camps of instruction to train them for the offensive; also, most of them had been through the trials of Verdun which were harsh but instructive; 65 of our divisions, out of 95 then had resteeled their energy and had become familiar with the new procedures of battle (rolling barrage, advancing in artillery fire, liaison, etc.), so that on the Somme we were to have units which were well trained and which were animated by the most splendid offensive spirit.

The English Army, which then had 54 divisions in France, that is to say, more than a million men, was ready to furnish a powerful effort.

To meet the attack, the Germans had available only one army (Second Army, General von Below) of two corps, one north of the Somme with five divisions in first line on a front of 30 kilometers, the other to the south with four divisions on a front of 28 kilometers. In rear of these first line divisions, there was a first reserve of three divisions, and still farther back, a second reserve of only one division. These forces were evidently inadequate to meet the attack of the Allies (an average of one division to each six to seven kilometers of front); and, nevertheless, the battle of the Somme was not a surprise to the Second Army. According to General von Below (1), the air service reported beginning from February, 1916, indications of attack on the English front; until May, however the cooperation of the French Army had not been counted upon, but in the beginning of June new information (particularly the arrival north of the Somme of our 20th Corps) showed that the French would prolong the English attack towards the south. In spite of the danger which threatened it, the Second Army was scarcely reinforced except in artillery; it thus was in a critical situation from the beginning of the battle, as is indicated by General von Below's order of 3 July: "The decision of the war depends upon the victory of the Second Army; the battle must be won by us in spite of the enemy's temporary superiority in artillery and infantry.... I forbid the voluntary evacuation of position. The enemy must cut his way over a path of Licadavres."

So that the German Army was not reinforced in time, was because of the lack of available men which had been absorbed by the battle of Verdun and by the Broussiloff offensive in Galicia (4 June); furthermore, Falkenhayn states that they were obliged to "give up the project of breaking the attack on the Somme by executing a major counterattack; we did not have the necessary forces in the West." Likewise, he gave up what might have been an advantage; to executing a movement of withdrawal within the zone of attack which he already knew fairly correctly.

b. Our offensive methods. -- At Verdun, the Germans applied the experience of our own offensive methods; from that time, it was possible to note the results that might be expected from these methods and also the disadvantages which were incident to them. A curious thing; we, nevertheless were about to apply these methods on the Somme, as they stood, hoping, not only to effect the progressive usure of the enemy; but also to secure the rupture of the front, which the Germans had never even attempted at Verdun (contrarily, however, to what we thought at the time). It may then be expected that the same methods were not equally suitable to such different purposes; all the more so since on the Somme we could not count on an effect of surprise comparable to that which the Germans obtained at Verdun.

Everybody, however, was convinced that, thanks to the system of successive attacks with limited objectives, we would wear down the enemy by the progressive and methodical conquest of his defensive organization, which would result in his final disorganization and the rupture of his front. The instructions

(1) Lessons drawn from the battle of the Somme by General von Below, 30 January, 1917.

of the Commander of the Group of Armies of the North pronounced this as doctrine; he said: "We must not be induced, during the course of the battle, over exploit partial advantages. Every advance of an isolated unit which forms a salient in the enemy's position is thus exposed to the concentration of the efforts of the hostile infantry and artillery. These salients are difficult to hold and thus weaken the offensive power of the attacking front. And further: "Only when the enemy's reserves have been used up, and he no longer opposes us with organized and continuous defenses, can we abandon the methodical mode of action, which is developed above and which alone will enable us to destroy organized fronts; and attempt to conduct the operations as a combination of battle and maneuver which finally becomes practicable in open terrain." (2) Likewise, the Commander of the VI Army, disturbed by the idea of some infantry officers wrote: "Some officers seem to fear that the method (organized battle from objective to objective) may break the dash of the infantry. In reality, what breaks the dash of the infantry is the presence of intact wire or the opening up of flanking machine guns. That is why the purpose to be accomplished is to destroy them before each attack. Not a slow preparation, but one to which all the time necessary is devoted to make sure that it be certain, then rapid execution; such is the formula for the attack." (3)

The necessity for rapidity in execution was always brought out. "The offensive conducted as indicated above can gain and maintain the superiority over the defensive, only provided it gain it by rapidity as well as by power provided its successive actions be accurate, strong, and delivered in the minimum of time, provided they be delivered by surprise and provided every means of attack be used without delay to break into the second position." (4)

But it was forgotten, that to obtain such a result, the artillery would either have had to displace forward very quickly (which it could not do); or it would have had to displace forward during the actual delivery of the attack (which it was forbidden to do).

To make it possible to exploit the successes gained, it was imperative that there be decentralization of command and that the executants be given back their full share of initiative; otherwise the enemy would always have time to reorganize and to throw up new lines of defense.

c. Review of the Battle of the Somme. -- Preparations for the battle of the Somme went on for four months. The artillery preparation, whose length was at first set at five days, was prolonged by a day and a half because of bad weather; it was directed against the first hostile position, but, at the same time adjustments were carried out against the second position, particularly south of the Somme, where the second position was too close to the first. This favorable condition allowed our artillery to open fire on the second position without changing position after the first attack succeeded. Trench artillery was used to destroy obstacles at close range, the high powered heavy artillery (5) to destroy distant objectives. Our counterbattery was very effective, and it was completed by the neutralization of the hostile artillery during the attack. Furthermore, the enemy's means of observation (terrestrial observation posts, balloons, airplanes) had been destroyed or were out of action on the day of the attack, with the result that the hostile artillery was

(1) The same idea as that which the Germans had at Verdun.

(2) Instruction of the Commander of G.A.N. on offensive battle, dated 26 April, 1916.

(3) Note of the Commander, VI Army, dated 8 June, 1916.

(4) Instructions of Commander, G.A.N. on offensive battle, date 20 April, 1916.

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handicapped in its firing; in fact, it was so badly crippled that it was hardly heard from until 5 July. The infantry was roughly handled by our bombardments; the Germans ordered the relief of units which had suffered the most, but our fires delayed and bothered these movements, so that they had not been completed south of the Somme on or about 1 July.

The attack was launched on 1 July on a front of 24 kilometers, from Commeccourt to Carnoy, exclusive, with two armies (Fourth Army, Rawlinson, Sixth Army, Gough), a total of 26 divisions, of which 15 were in first line; the French attack on a front of 16 kilometers, from Carnoy, inclusive, to Foucaucourt, astride the Somme, with one army (Sixth Army, Fayolle) a total of 12 divisions. The first German position was carried along the whole front of Fayolle's army and of Rawlinson's army; but to the north, Gough's army, after progressing rapidly, was fired into from the rear, and was forced to regain its positions of departure; it did not resume its attack until 26 September. On the front of the other two armies, the second position was taken on 3 July; but the advance was more pronounced south than north of the Somme because the enemy, not expecting such a strong attack on that part of the front, did not have reserves to meet it; and so, on the night of 4 July, there was practically nothing in front of our 1st Colonial Corps; as its infantry could not go beyond the assigned objectives, the cavalry was pushed forward; it penetrated into Barleux, Belloy and Bomy without meeting resistance, and then was ejected from these places by the arrival of hostile reinforcements. (1)

Rawlinson's army resumed its attack on the 14th and Fayolle's army on the 20th; they made some fresh gains. Then, on 30 July, they made a simultaneous attack and took their objectives. The month of August saw only actions of detail. However, the usure of the Germans was becoming apparent, and the scheme of extending the front of attack farther to the south by putting the Tenth Army (Micheler) into line was adopted. The Sixth Army (thirteen divisions) was not to attack north of the Somme on a front of 8 kilometers; the Tenth (15 divisions) to the south, on a front of 18 kilometers; they were to be supported by a mass of 1200 pieces of heavy artillery (of which 116 were modern) and 1200 trench mortars, although nearly 200 pieces of heavy artillery were still retained on the Verdun front.

On 5 September, after a preparation of five days, the French attack was launched in liaison with Rawlinson's army; it seized the entire position. On the 14th, Bouchavesnes was taken by surprise; but, as on 4 July, this success was not exploited; the breach, open for an instant, was closed the next day, before we could enlarge it. While the advance kept going by means of local actions, the VI English Army (Gough) attacked on 26 September and gained some success. Unluckily the rains, which, in this unfavorable terrain crippled extensive operations, came on. In spite of this halt in the operations, the Commander-in-Chief wished to continue them during the winter, in preparation for the operations of 1917, by not giving the enemy any let up, but the English represented that the condition of their troops did not permit it. Although there were some local attacks in October, the battle of the Somme could be considered to be over. After having taken the hostile organizations, in pitched battle, to a depth of from 10 to 15 kilometers, the English stopped in front of Bapaume and the French in front of Peronne, with the enemy, more or less intrenched, still in front of them.

d. The results. -- The results gained by the offensive of the Somme were to break the enemy's will and to regain the initiative of operations for us. Beginning with July, the Germans were forced to relieve units for the Verdun front to reinforce the Somme front, and, when on 29 August, Falkenhayn was replaced by Hindenburg, one of the first acts of the latter was to suspend the offensive against Verdun.

Another positive result was the usure of the adversary's forces, which was already visible by the end of August; in two months the Germans had lost

- (1) The enemy did not begin to regroup his forces which had been dislocated by the attack until between the 5th and 8th of July; he proceeded to an important reorganization which resulted on the 19th in doubling the First Army and the organization of five groups of divisions with corps staffs.

on the Somme as many men as they had lost in six months at Verdun, and he put into action nearly the same number of divisions on each front; in any event, when the battle of the Somme ended, there had been 138 German divisional engagements (some of them having appeared two or three different times) against 75 at Verdun. In order to forestall the crisis in effectives, the enemy, using the class of 1917, had to create a first lot of 27 new divisions which allowed him to meet the most critical phase in September; he was used to such an extent that four months later he refused battle and executed a retreat. The French alone had taken 50,000 prisoners and 200 guns.

In the 44 French divisions, which took part in the battle, the total losses amounted to 114,000 killed or missing and 205,000 evacuations; while the defensive battle at Verdun, from February to June, had absorbed more than 60 divisions and had cost us 156,000 killed or missing and 263,000 evacuations or 100,000 men more. Likewise, we lost only 30,000 killed in reconquering terrain north of Verdun. Thus it was cheaper to conquer terrain than to lose it. In any event, a comparison of the above figures is certain proof, contrary to opinion which was too widespread that the offensive is less costly than the defensive, aside from the fact that the latter produces anguish which is very difficult to sustain. The experiences of Verdun and the Somme, which were furthermore to be confirmed by the events of 1918, are eloquent; they showed that defensive battle consumes more effectives than offensive battle and that it imposes a moral strain which is dangerous for the army and for the country and that it is better to take the risks of the attack than to submit to the perils of the defense. (1)

Finally it must be noted, that after four months of terrific battle, the Allies were neither able to succeed in bringing about open warfare, nor to pass to the so-called phase of exploitation of success. It was not, however, because they were lacking in means, particularly in artillery; but because the methods used did not allow a fast enough succession of attacks to prevent the enemy from "reestablishing himself in a stable and orderly situation", so that he always had time to construct another position farther to the rear. The intervals of time which separated the great attacks of the battle of the Somme were too long: 1 July 14-20 July, 30 July, 3 September, although each of these was followed by a number of operations, which were only of a local character. Besides, these methods did not allow the exploitation of favorable opportunities, such as that of 4 July in front of the 1st Colonial Corps and of 14 September at Bouchavesnes in front of the 7th Corps.

Further, as General Mangin notes (2): "The results of the battle of the Somme were not recognized in France....our losses were exaggerated, while those of the enemy were not known." After Verdun "that still open ulcer which consumed our forces" (Ludendorff), the Somme added to the German crisis in effectives. (3) Ludendorff wrote: "The demands made on us both for officers and troops were extraordinarily high.... Division and other troops had to be thrown into the Somme front all haste and had to be held there a long time... the troops were being used up; we were constantly on the eve of a catastrophe. But that near-desperate situation escaped us to a great extent and in France only considered that the ungrateful struggle which was going on on the Somme had not resulted in the break-through. While waiting for a pretext for relegating the Commander-in-Chief himself to a position of secondary importance, the Commander of the Group of Armies of the North was sacrificed.

- (1) Ludendorff bases his justification for the offensive of 1918 on that undeniable truth.
- (2) Comment finit la Guerre by General Mangin.
- (3) In order of General von Below indicates this: "The battle in progress entails the loss of so many men for no purpose than the defense, that I am forced to prescribe that methodical counterattack will never be made; except those of minor importance and which are only of an absolutely local character.

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5. LESSONS ON THE OFFENSIVE. -- If surprise, both strategic and tactical had been obtained by the Germans at Verdun (1), it was not obtained, as we have seen, by the Allies on the Somme, except possibly south of the river, where the adversary was not expecting so highly a developed an attack on our part.

On the contrary, at Verdun as on the Somme, we note the constantly increasing power of the attack by a huge deployment of means both in artillery and in air service. It was on the Somme that we, for the first time, put in to line such a great quantity of heavy artillery; on 3 September the attack was supported by 1200 pieces of heavy artillery (of which 116 were modern), 106 G.P.F's, and 1200 trench mortars for a front of 26 kilometers; this represents one 75 per 38 meters, one piece of heavy artillery per 20 meters and one trench mortar per 22 meters. This artillery density seemed to be the maximum. (2) From now on, the increase in our artillery materiel, resulting from the execution of our manufacturing program of 30 May, 1916, was not to lead to the accumulation of a greater number of pieces on the same front, but to an extension of such front. (3)

Further, the battles of 1916 brought out the value of new facts.

1. - First, the mastery of the air, which appeared as a new condition for success. Profiting by the lessons of Verdun, we not only entered the battle of the Somme with a great superiority of means in air service, but this superiority was still greater after we had driven down all the German balloons. The destruction of the balloons was so complete that on 18 July there was only a single balloon in the air, and this was at an elevation of 400 meters and 10 kilometers within the enemy's lines;

2. - Next, the use of toxic projectiles, which tended to become general, and which was beginning to give excellent results; they were still used only for the neutralization, during the execution of the attack, of the means of the defense which we had not been able to destroy during the preparation. However, the use of toxic shell would permit of the reduction of the length of the artillery preparation, provided they be used not for the destruction but for the neutralization of the means of defense; this new conception was not to find application until 1918;

3. - Lastly, the appearance of the English tanks on the Somme (15 September); unfortunately they were too few in number and the infantry which accompanied them still did not know how to operate in liaison with them; furthermore, they only acted to draw the Germans' attention to means of combatting them, as was shown by their Regulations for position warfare published at the close of 1916.

However, the combat methods ~~laid~~ down by the Instructions of January, 1916 had not given full satisfaction.

A note of the Commander-in-Chief, dated 9 June, 1916, relative to events at Verdun, remarked that the infantry attack formations were still too dense

(1) Note in passing that during the progress of their successive attacks, whenever surprise was no longer possible, the Germans particularly sought destructive effect, and accordingly made long artillery preparations (two days, 6 March; three days, 23 June; two and a half days, 11 July). We have shown by what methods the Germans sought and obtained strategic and tactical surprise in the attack of 21 February.

(2) At the time of the battle of the Somme, considering the force and organization of the enemy and the number of our heavy artillery batteries, the front on which we could attempt an attack was considered to be from 30 to 50 kilometers.

(3) Experience of the Somme led to the adoption of the caterpillar for the rapid displacement of heavy artillery in varied terrain.

and that assault waves in which the men were elbow to elbow were to be absolutely forbidden. On the other hand, they urged commanders, when faced by the multiple incidents of battle, to show decision and to require the rapid execution of their orders.

Then a Note of 27 August drew the attention of all to the marked increase in the offensive power of the infantry which had resulted from the issue of the automatic rifle, Vivon-Bessieres grenades and of the 37-mm gun. The Note said: "This increase in power should find its principal application in the exploitation of success. The infantry which has carried its objectives, has the strict duty of seeking exploitation of success; it should take advantage of the occasion to gain, perhaps at small costs, the results which it would pay for dearly the next day or on the following days." But the procedures which was indicated, with this result in view, were still too timid, patrols to outline the new front occupied by the enemy; and small offensive groups, whose mission was to disorganize the defense by seizing important points, were to be sent out. The general line which was not to be passed by these groups was to be fixed by the commander of troops who commanded the artillery in direct support of the infantry (ordinarily the division commander).

For his part, the Commander of the Group of Armies of the North stated in one of his Instructions: "It remains understood, furthermore, that the methodical progression to from stated objectives, does not exclude exploitation, immediate and as extended as possible, in any direction whatever, of the defeat or even of the confusion of the enemy, which may occur during the course of operations. This is an eventuality for which the initiative of all commanders of large units should be prepared." Effort was then made to add flexibility to the methods of attack, which were recognized as being too rigid; but these efforts were in vain, and the Commander of the VI Army, in his Note of 6 August, gives us to understand why: "There has been noticeable lately a number of infantry officers a deplorable mentality which, if it persists, will tend to rob the infantry of all its offensive power to make of it nothing but a passive agency for the occupation of terrain which the artillery has previously cleared of all obstacles and even of all of the enemy. In order to be able to attack, they actually demand total destruction, which is often useless, and which, moreover, is impossible of accomplishment over an extensive front..... Such pretensions may give cause for uneasiness as to morale; in every case they indicate a complete misconception of the role of infantry. The canon prepares attacks by opening the way, by overthrowing the material obstacles which oppose the progress of the infantry, but only the latter can exploit these destructions by progressing into the enemy's lines by exploiting local conditions to the utmost. In a word, the infantry must fight and fighting consists of will and intelligence; resolute will to go forward, towards and against anything; intelligence in the handling of troops, held up on a part of the front, progressing on another, but always directed towards effort.... The infantry must thoroughly understand that the canon can not do everything and that, when it meets resistance at certain points, it must overcome them by its own means, that is to say, by its fire and ability to maneuver. The infantry is fully entitled to audacious and reasoned initiative; it will always be worth what its leaders are worth."

Similarly we read in the Report of a division which fought at Verdun from April to July: "Without good infantry no success is possible. It is the infantry which conquers ground and which holds it. Even when the artillery has laid down a perfect preparation, if the infantry does not function, nothing has been accomplished. If the infantry does not endure fire in defense, we shall be in no condition to inaugurate counterattacks after an initial success; the result will be defeat or the impossibility of retaining initial success. Therefore, the ability of infantry and of its command is capital."

On the enemy's side, the same observation: General von Below stated in his Note of 30 January, 1917: "In this war, in which tactics and numbers seem to be preponderant; in the final analysis, however, it is the force and will of each individual which wins the decision." And we shall see Ludendorff constantly express the same idea in his Instructions for the offensives of 1918.

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(1) Example: Souville the 15th

Was this not truly the voice of reason and of common sense; and was it not correct to say that the infantry was a little only too willing to accept the secondary part which had been assigned to it in the attack? Experience very quickly showed that this nefarious tendency had to be counteracted, and that the last analysis success depends upon the professional and moral worth of the infantry, which must be trained to conquer the resistance which opposes its progress by its own means; that is to say, to force the battle into the interior of the organized positions. But it was already somewhat late to stem the tide of opinion which showed a tendency to establish itself.

It seemed, actually, that the spirit of method; and codification, which is the characteristic of that position warfare, was dominating everything. It is true that the preparation of an attack required infinite care, method and foresight. But, from the instant the infantry attack is launched; and when, whether we wish it or not, it is thrust into the unknown, initiative should again be given its rightful place. The executant, who alone can see and judge, must be allowed to make decisions, of course, within limits which are determined in advance by his mission and the nature of his command. Only those leaders who are on the field of action are in a situation to conduct the battle and to exploit its incidents within opportune time. Due to the desire to operate methodically, it does not seem that adequate attention was paid at Verdun, after 25 February on the Somme, after 4 July, to the fact that the assailant had nothing in his front at the critical time for the defensive, but improvised positions; it is often obligatory to proceed in any possible way and very rapidly, the troops coming up at the last minute to attack or counter-attack, practically without making any reconnaissance, the artillery preparation being made by the batteries in place and not by those of the division which was going into action, nor even under the orders of the commander of its division artillery. (1) And, however, wrote General Mangin: "the establishment of various plans which regulated everybody's part in the attack was still considered necessary, as if it were a question of taking a position which had been leisurely organized..... Method can be learned, but only practice develops the sense of improvisation, when such sense is not inbred."

We should not therefore center our attention exclusively on the case of the attack or defense of positions which have been carefully and deliberately organized; we should form the habit of cutting loose from a too formal procedure, which circumstances will not always permit our following (the same observation will be made in the engagement of our divisions during the crisis of 1918). "The automatic attack, where every detail up to the final culmination has been arranged for beforehand, is a utopia", said the report of one division. More flexible procedure, which is capable of adaptation to the varying circumstances of battle, is required; that is to say, the procedure must be based primarily on the use of tactical reconnaissance by the executants and upon their initiative, consequently upon the decentralization of command.

However, though our procedure had disadvantages, it allowed us, by the very reason of its slow and methodical character, to attain great progress in certain details.

It was thus that the application of the Instruction of 17 April, 1917 led to important perfections in methods of liaison between the infantry and the command and between the infantry and the artillery, and insured unity of effort.

In the same way, the artillery perfected its mechanism of fire; starting in June, at Verdun; the rolling barrage, regulated by the rate of the infantry and preceding its advance, was substituted for the old barrage, which displayed forward by bounds, of a given amplitude, in front of the infantry. The infantry acquired the habit of sticking to the barrage, to march, so to speak,

(1) Example: At Verdun, the 37th Division was put in place in the Fleury-Souville sector during the night 14-15 July to attack on the morning of the 15th.

in the fire of its artillery, which gave it the best assurance of benefit of surprise. (1)

Counterbattery fires, whether intended for destruction or the neutralization of artillery, were conducted on a large scale and gave excellent results both at Verdun and on the Somme (2); the Germans suffered so much from the precision of our fires that they did not delay the abandonment of their own fires to adopt our procedure.

Lastly, the intelligence service, and particularly that of the artillery (A.I.S. (3)), developed and coordinated by the second bureau, achieved good results; thus certain fires were executed on the Somme with such timeliness and with such precision that the prisoners who were captured believed they had been betrayed. (4)

But these operations again exposed the inaptitude of our troops for rapid organization of the terrain during the progress of the battle; every body worked for himself without any supervision; result: much dirt was made but no coordination; there were no trenches, no adequate shelters. Also, Note of the Commander-in-Chief, dated 2 July, 1916, issued the reminder:

"The organization of a piece of terrain, during the progress of battle, is a military operation, which like any other, can succeed only where there is leadership; the commander of each echelon should therefore come to a prompt decision and should transmit his orders in the form of a plan of execution."

"That superiority in the organization of ground must be gained over the enemy", during the progress of a defensive battle as well as during offensive battle;

"That the reserves should be used in the execution of the works; to be a reserve does not mean to be at rest";

"That, just as troops go into battle by constituted units, so do they work by constituted units under the orders of their leaders; work on the battlefield is not fatigue";

"That work goes on day and night" and that fatigue of troops is not an excuse;

Lastly, "that loss of time occasioned by reliefs must be reduced, and negligence in the upkeep of works must be prevented."

Thus, two years from the beginning of the war, we still felt the effect of the lack of instruction of troops in the execution of works and we had still not conquered the troops' repugnance to digging.

Motor transportation was used on a large scale for the first time at Verdun and then on the Somme; thanks to foresight which dated back to 1915

- (1) The Germans claimed that this is in the form of a plan of execution. From the Lessons drawn from the battle of the Somme we find: "Our principle was that the first infantrymen should enter the hostile position at the same time as the last shell, has been adopted by the enemy."
- (2) On the Somme, in order to spread out the effects of our counterbattery nearly all the 77 batteries were divided into half batteries.
- (3) S.R.A. (Service du Renseignements d'Artillerie)."
- (4) General von Below, the Army Commander, himself wrote in the Lessons drawn from the battle of the Somme (30 January, 1917): "It is striking to observe that the guns of our enemies also seem to have greatly less disposition than our own. Our enemies also seem to understand map firing much better than we. In fact, in weather which precludes any direct observation and which demands considerable corrections of the moment, they succeeded in making precision fires upon objectives of very limited dimensions."

to the activity displayed by this service, the "Sacred Road" carried a daily capacity of from 5000 to 6000 trucks, which represents a density of about one vehicle every fifteen seconds. During the battle of the Somme the traffic on the main artery Amiens--Provyart, common to two armies, exceeded even that density; on 22 July, one of the days when traffic was heaviest, this road was used by 3500 trucks and 4500 horse drawn vehicles, a density of about one vehicle every six seconds. To produce such efficiency, the motor transport service was organized, on the model of railroad practice; march graphics, staffs for regulating, for loading and unloading, circulation, restricted roads, continuous roadway maintenance, etc.....

6. LESSONS ON THE DEFENSIVE. -- When great battles of Verdun and the Somme came on, the defensive had not anticipated the means of facing the gain in power with which the attack had been endowed and which was manifested by intense and prolonged bombardment. All attention was still centered on the defense of the first lines of trenches, which was constantly becoming more difficult and costly; as the conservation of terrain was considered of primary importance, the real purpose of defensive battle, which is to inflict more losses on the attacker than he inflicts on us, was ~~lost~~ sight of.

Both sides recognized the necessity for a plan of defense which should provide for the details of eventual reinforcement and the part to be played by each unit in case of counterattack.

Opinion was also unanimous as to the efficacy of counterattacks, provided they be immediate, that is, delivered by troops who are already on the ground and, delivered on the initiative of their own leaders. Battalion and regimental commanders were proven to be the soul of the defense.

On the French side (1), there was the conviction that, if the attack was provided with adequate means, it could seize the first lines without striking a blow; there was no hesitation then to placing the real defense on a principal position of resistance farther to the rear and which was to be determined in each particular case by the commander.

In arranging the defensive organizations, some means of overcoming the effects of the hostile artillery preparation must be found. To accomplish this:

-- The means of defense were to be echeloned in depth, by reducing the strength in the front lines and by providing troops which would be available for counterattack.

-- The means of defense were to be dissimulated, by placing essential organizations outside the trenches (machine guns, automatic rifles, observation posts), and by carefully camouflaging them.

-- The means of defense were to be protected by making generous use of shell-proof shelters and of underground communications.

The system of isolated centers of resistance having been condemned at Verdun, there was a reaction to continuous lines of trenches in whose net-work the strong points were to be included. (2)

(1) Note on the Lessons to be drawn from events at Verdun, 5 April, 1916. -- Employment of artillery in the defensive, G.A.C., 27 May, 1916. -- Note of G.H.Q., 9 June, 1916. -- Note of G.H.Q., 26 August, 1916.

(2) As a result of the power of the artillery in the attack, both obstacles and flanking organizations, which were to fire in the passive intervals, were wiped out. The centers of resistance, generally very apparent, became nests of projectiles. Thus, the enemy was able to advance in the undependent intervals and to envelop the strong points (Bois des Caures, Bois d'Haumont, Rognoville, Forges).

After Verdun we were astonished at the power which the artillery had attained. The Instruction of G.A.C., 27 May, 1916, on the employment of the artillery in the defensive opens as follows: "The prolongation of the war, its present form, and the constant growth and increase in materiel by the belligerents, from day to day augment the part which artillery must play in battle." But the Note of 5 April, 1916, on the lessons to be drawn from events at Verdun, informed us what was to be thought of that power; "Events have proved that the defenders who have been beaten down by that power, are able, when the assault is delivered, to occupy the battered up trenches and to hold the enemy there. In the last analysis, the artillery has been able to reduce the material means of the defense and to wear down its morale, but it has not been able to destroy it."

Considering the power displayed by the attack, what should be the attitude of the artillery of the defense? To be able quickly to support the infantry, it was to be decentralized and organized into groupings corresponding to the different units in line, as prescribed by the Instruction on the employment of heavy artillery, dated 20 November, 1915; but this decentralization must not degenerate into isolation and over-specialization; it was to be limited by the requirement, both in the defensive and the offensive, that the artillery must be able to place powerful concentration of fires, to do which the artillery must be very flexible in the handling of its schemes of fire. "The tactics to be used in the defensive, and which has produced complete success whenever it could be applied in time, has consisted in replying to every preparation by a like preparation, to every increase in violence of fire by a similar increase on opposite points; and by thus crushing the assault troops before the launching of their attack." (Instructions of G.A.C., 27 May, 1916). This is offensive counterpreparation fire (C.P.O.) based on the concentration of artillery fires which was used with success at Verdun, and which later gave excellent results.

In all cases, as the artillery preparation might destroy all telephonic communication over considerable depth, provision must be made for the use of all other methods of liaison: runners, rockets, carrier pigeons, signals from observation posts, optical signals, radio, etc....(1)

On the whole, the destruction of the first lines by the artillery preparation led to drawing back the real defense to a line farther in rear, but which was still a part of the first position, which remained the principal position of resistance. In addition, the following were made apparent;

- the importance of a methodical counterpreparation;
- the necessity for the echelonment of the defense in depth;
- the obligation of camouflaging defensive organizations;
- the efficacy of counterattacks, which, after Verdun, were somewhat too much considered as being the panacea of the defense;
- the value of continuous trenches and the danger of isolated **forts** which, fortunately, were present only on part of the front.

Lastly, the defensive operations of Verdun, showed that "the moral factor is more preponderating than ever. In proportion as the mechanical power of destruction increase, the resisting capacity of the warrior soul is developed; in the last analysis, they remain superior to the effects of materiel." (Note of 5 April, 1916.)

This Note again insists on the necessity for requiring troops to execute indispensable works; to such an extent it is true that the habit of digging had still not become a reflexive part of the infantry. "Every man should be trained in mining and sapping; pioneers and machine gunners should particularly be apt in building shelters. Every colonel who is not active in this

- (1) The same lessons were drawn by the Germans from the battle of the Somme.

training of his regiment his command. Every 1 to do little or poor

On the German side, on one hand, to our surprise, the insufficient echelonment, to the too great reliance on the offensive, Ludendorff in November in a series of Reconstructions these up he was inspired by General von Below, commander of the

First of all the fight for the conservation of time conserving the position by a clash of arms commanders were authorized to move forward whenever they

Defensive organization

-- Greater echelonment, 15 to 20 kilometers behind the front; to be able to retreat it;

-- Increased resistance

-- An unusually high

This was the type of position in the winter

Not only the organization echelonment in depth (in the first lines being occupied by the necessary (one man per kilometer) to deliver immediate

The conduct of the every effort was to be made by the initiative. In the initiative. By the artillery, and by the mobility of the attacker, forced to harass his troops in the rear on him the maximum loss

The defensive man

1. On preventive measures (as at Frise in

(1) To this must be added that the command does not

(2) Until the appearance of the enemy, scarcely to have been from the events in the offensive and defensive as

(3) In fact, the idea made, goes back to the time when the great public works were in retreat. In the winter of 1914, the doctrine. Later, it was covered with Wagnerian names:

training of his regiment is culpable; he is preparing serious misfortune for his command. Every leader who allows a regiment, through devious pretexts, to do little or poor work, fails in the first duty of command."

On the German side, they attributed their reverses on the Somme, on the one hand, to our superiority in artillery and aviation; on the other hand, to the insufficient echelonment of their positions in depth; and, general observation, to the too great density of troops in first line. (1) Furthermore, Ludendorff in November and December, 1916 codified the new defensive doctrine in a series of Regulations for position warfare for all arms. In drawing these up he was inspired by the lessons drawn from the battle of the Somme by General von Below, commanding the I Army. (2)

First of all the object of the defense was not to put up a desperate fight for the conservation of terrain, but to wear down the enemy while at the same time conserving its own forces. Consequently, the battle was to be conducted by a clash of material and not by a clash of men; army and corps commanders were authorized to prescribe the evacuation of certain parts of the terrain, whenever they thought such action necessary.

Defensive organizations were to consist of:

- Greater echelonment in depth, so as to constitute a true fortified zone, 15 to 20 kilometers deep, and capable of hemming in an attempt to penetrate it;
- Increased resistance in shelters by the general use of concrete;
- An unusually high development of accessory defenses.

This was the type which was followed in building the famous Hindenburg position in the winter of 1916-1917. (3)

Not only the organization, but the means of defense were to be greatly echeloned in depth (infantry, artillery and particularly machine guns), the first lines being occupied by only the effectives which were absolutely necessary (one man per 4 to 6 meters), but supports being ready to reinforce them or to deliver immediate counterattacks.

The conduct of the defense was to consist in real maneuver, in which every effort was to be made to gain the initiative over the enemy. The Regulation said: "In the conduct of the battle, the defense should not give up the initiative. By its activity, particularly by the activity of its artillery, and by the mobility of its forces, it should check the advancing power of the attacker, force him to thicken his first lines, break up his plans, harass his troops in their assembly positions, prevent movement and inflict on him the maximum losses."

The defensive maneuver was to be based:

1. On preventive actions: local attacks to disrupt offensive preparations (as at Frise in 1916); artillery fires for the purpose of destroying

(1) To this must be added a certain penury of artillery ammunition, which the command does not mention, but which nevertheless was real.

(2) Until the appearance of these Regulations, the supreme command seems scarcely to have interfered; Army, corps and division commanders drew from the events in which they had taken part such lessons on the offensive and defensive as they thought best for the instruction of their troops.

(3) In fact, the idea of a fortified position, to which a withdrawal could be made, goes back to the battle of the Somme, a time at which the Germans gave great publicity through the press to the idea of a strategic maneuver in retreat. The Hindenburg position, built to a great extent during the winter of 1916-1917, was the first application of this new defensive doctrine. Later, in 1917, the whole rear area from the sea to the Moselle was covered with positions echeloned in depth and which were given the Wagnenian names: Siegfried, Wotan, Brunhilda, etc.

the hostile artillery (the Germans were now using precision fire in their counterbattery work), for the destruction of preparation both in the forward and in the rear areas, and finally for the annihilation of assault troops before they delivered their attacks. The barrage, upon which the defense heretofore depended, was not to be considered only a makeshift, to which no course was to be had only at the last minute.

In order of importance, the artillery struggle was to be considered first offensive indication. The Regulations said: "It is of exceptional importance to overcome the hostile artillery...., by conducting well adjusted fire for destruction against a definite objective until such objective has been annihilated." The maximum of available means must be diverted to this purpose, and this must be done as soon as possible; delay in starting counterbattery or the use of an inadequate number of batteries may compromise success;

2. Upon the resistance of the first lines, by a fight which does not necessarily take place upon that first line, but about it; the defense is to be mobile, the defenders of the first line moving to the front during the bombardment, but the troops in support always remaining in rear;

3. Upon the offensive use of reserves, but in an area to the rear, of mean range of the artillery of the attack which will not yet have been able to displace forward (that is to say, between 5 and 8 kilometers from front line); these reserves, themselves greatly echeloned in depth, and placed in position in rear of threatened areas before the attack, will be intended for violent and rapid counterattacks, organized a priori, and launched by prearranged signal, for the purpose of seizing the assailant who has progressed beyond the range of his guns before he can reorganize on the ground. This task of counterattacking in depth was to be assigned to divisions, which were called divisions of intervention.

Such was the new parry which the defense set up; to the echeloning of organizations in depth, which was to make impossible the violent break-through in one impulse, it was to now join the echeloning of forces in depth, which was to have the effect of scattering them and to make still more illusory the artillery's efforts at destruction. Finally, the conduct of the defense is to take on an aggressive character, which until now it did not have.

Furthermore, Hindenburg, concerned by the serious and regrettable reverses caused by our offensive of 24 October and 16 December, 1916, north of Verdun, sought their causes in his Instruction of 25 December, which he imputed to:

-- The low morale of certain units, which it was important to correct by effective measures and by a greater solicitude on the part of the officers for their subordinates (clothing, food, shelter, leaves); "whoever does not function in his position should be impitiously eliminated;

-- To the presence of deep shelters in the first line, from which the infantry could not get out of quickly, and to the lack of protection for the observation posts;

-- To the non-intervention of the troops echeloned in rear of the first lines, the defenders of which were not supported;

-- Finally, to the inaction of the artillery: "The fundamental and basic way of homing in the hostile attack is to counterbattery his artillery with the assistance of the air service."

From the exocutants the complaint came that the machine gun was too heavy, especially its mount, and they demanded one which would be easier to handle. This was the origin of the light machine gun which was to make its appearance in 1917 on the Russian front.

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7. THE INSTRUCTIONS OF THE END OF 1916. FIRST ATTEMPT TO RECONCILE METHOD AND RAPIDITY IN VIEW OF EXPLOITATION OF SUCCESS. -- After the experiences of Verdun and of the Somme, the High Command, noting the disadvantages of our offensive methods, attempted to modify them until the time should be opportune to completely break away from them.

The Note, Provisional Annex of 27 September, 1916 to the Instruction of 8 January on offensive combat of small units confirmed the remarks contained in the Note of 27 August and established the new infantry organization (the battalion of three companies and one machine gun company; establishment of specialists). It specified that "in the defensive, it can stick more closely to the ground in order to await the artillery barrage and that, in the offensive, it had recovered a power and maneuver ability which had been very much reduced since trench warfare had begun. As soon as the artillery has made a breach in the hostile organizations, the infantry can dash into the interior of such organizations and by its own means break down all local resistance and hostile counterattacks." The Annex thus contemplates the possibility of the infantry itself exploiting success by combat, even though the support of the artillery be lacking. Each echelon is to establish a plan of exploitation of success for; "the conquest of its assigned action; limitation of objectives does not mean the suppression of the spirit of enterprise. Initial success was thus to be completed "by the capture of strong points whose capture would be dearly bought the next day; particularly every strong point abandoned by the enemy should be immediately occupied." These proscriptions marked the beginning of the reaction against the methods of January, 1916, and to that extent reestablished the role of the infantry in battle; but, for fear they had gone too far, the Note immediately added this restriction: "The battalion commander should not lose sight of the fact that exploitation of success is not accomplished by the infantry alone, but takes place in combination with the artillery."

Further, this Note-Annex gave the force of regulations to the combat formations of the infantry which had already been used at Verdun and on the Somme, and which were characterized by reduction in density and increase in depth. The interval between skirmishes, which was one pace at the beginning of the war, two paces in January, 1916, was now increased to four or five paces, which appears to be a maximum, if any degree of cohesion is to be preserved in the combat line. In any event, it had taken two years of war and the introduction of automatic arms in the infantry to finally thin out the attack formations, which had been seen to be too dense from the time of the first battles.

Further, the Instruction of 8 December, 1916, on the employment of cavalry in battle combined the Annex No. 4 to the Instruction of 16 January and the Instruction of 8 June, 1916, in a single document. The cavalry which had now been reorganized on the pattern of the infantry and whose fire power had been greatly increased (1), considered dismounted action as normal. In order to exploit success obtained by the other arms, to prevent a beaten enemy from reorganizing and to force his retreat into a route, the cavalry should "adapt its combat methods to the conditions of modern battle which are characterized by fire power." The missions which it was to fulfill in battle were of two kinds:

1 -- Immediate exploitation of success in liaison with the attacking army or armies;

2 -- Distant exploitation, in the execution of which cavalry large units can count only on their own forces.

(1) Squadrons were reduced to three platoons; and, besides the carbine with bayonet, were armed with automatic rifles and hand and V.B. grenades. Regiments were equipped with two machine gun sections; and cavalry divisions with two groups of auto-cannons and auto-machine guns, one light regiment of three battalions and three machine gun companies and one cyclist group of 220 rifles.

Division cavalry or corps cavalry is the real "accompanying cavalry" of the infantry. It should be the first to enter the battle as soon as the advance of the friendly infantry ceases to encounter continuous obstacles."

"Cavalry large units go into action when a breach has been made in the enemy's defensive system, or when the enemy starts to retreat on a broad front." It then initiates the pursuit "constantly striving to overtake and turn the main bodies so as to beat them to the position where they may wish to make a stand." This requires the Army Commander to establish a plan of pursuit which will include three phases: 1 - Preliminary assembly and getting over the lines; 2 - Execution of the pursuit; 3 - Battle.

This very summary review of the Instruction of 8 December, 1916, shows that we still believed in the important part which the cavalry, thanks to its mobility and fire power, could play in the phase of exploitation of success.

Lastly, the prescriptions of liaison were recast in an Instruction of 16 December, 1916, which differentiated the means of information from the means of transmission, and which laid down regulations for the use of airplanes in battle (infantry accompanying plane, command plane messenger plane), and for all the means of transmissions which were intended to function simultaneously.

The Instruction of 16 December, 1916 covered the purpose and the conditions of a general offensive action definitely; they established a new viewpoint by attempting to reconcile method and rapidity so as to secure better exploitation of success. In this it marked real progress over those which preceded them.

It started out by republishing a Note of 27 November calling attention to the tendency to reduce the extent of fronts of attack, to select objectives which were too close, to increase the time interval between two successive operations. "Experience has proved that this method, while giving certain results, has not assured the maximum use of the forces engaged and has often limited the exploitation of successes attained which was possible. It has always given the enemy time to reconstitute his forces; and, as fast as our advance progressed to organized new lines of defense."

Further, it said: "operations with limited objectives induce in the command a narrow conception of battle. Through prudence, operations are limited to the strict accomplishment of the set plan; such an attitude forbids the elaboration of the plan, in case of complete success or of weakness of the enemy..... In certain cases while exploitation has been provided for, its organization is not suitable for rapid and effective use. We are surprised at a success which we did not believe could be so easy, we do not know how to take advantage of it, because we have not prepared the operation on broad enough lines and with enough confidence."

It is therefore imperative to get back to the idea of attacks delivered on as broad a front as possible, which contemplate the seizure of the hostile artillery line; such attacks to be continued within the shortest possible delay; and such attacks to be in readiness to exploit a complete success.

Consequently, a method is to be applied, particularly during the phase of preparation; method is not to be extended into the phase of execution only in accordance with the provisions of the various plans which have been established in advance. Rapidity and continuity, facilitated by the power deployed in the attack, are to be sought above everything during the phase of execution.

To this end:

-- the most powerful means should be applied where it is believed the advance will be easiest and in conformity with an idea of maneuver;

-- the artillery preparation is against, not only the hostile first position, but also against all of them that the artillery can reach;

-- the infantry is to progress without any halts excepting those absolutely necessary to reestablish order or to execute new constructions.

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As a consequence:

No more limited objectives; "the objective assigned to an attack constitutes a minimum line which must be reached with certainty, but beyond which progress may and should be made." Thus tactical exploitation is more sure to be made during the battle of penetration through the hostile organized positions;

As soon as the organized positions have been taken, the phase called strategic exploitation will be started, and will be executed by the large units held in reserve for that purpose (divisions, cavalry divisions, cavalry corps, etc.....); in other words, the pursuit, but a pursuit in which care is to be always taken to provide the infantry with the support of its artillery.

Time consumed in displacing the artillery is to be reduced, thanks to the detailed provisions of a plan of displacement, drawn up so that the batteries shall always be able to fulfill their different missions, no matter what progress the infantry may make. (1)

Nevertheless, the attack will progress by successive stages, but the objectives no longer being limited beforehand, these stages will now depend only on the resistance encountered;

Foresight before the attack is to be more and more included in numerous plans, for the purpose of producing greater rapidity of execution, and particularly so as to avoid being surprised by success;

In execution great initiative is to be left to the leaders who are on the ground, particularly to brigade and regimental commanders so as to facilitate "energetic and audacious" exploitation of success which requires the taste for risk on the part of all; however, attention was also called to the fact that good order, rapidity, continuity and the constant support of the infantry by the artillery are the necessary conditions for success; for the infantry order still had the ascendancy over rapidity.

The role of the artillery was still centered on destruction; destruction of the hostile artillery before and during the preparation, its neutralization being contemplated "as second best"; destruction of obstacles opposing the progress of the infantry, but now to be limited to the essential elements of the defense (2); in any case, the delivery of the infantry attack was still to be subordinated to the results secured by the artillery preparation for which the commander was to be personally responsible.

Tactical surprise was now the only surprise contemplated, and "it is the duty of the commander to insure it by every possible precaution"; we see the following measures taken to secure it:

-- the simplification of preparatory works and installations, which will allow the time spent in preparatory work to be reduced;

-- the general use of camouflage, and a rigid control of conversations and correspondence, which will insure secrecy of preparation;

-- less effort made to secure complete destruction.

(1) The rapidity with which the offensive may progress depends essentially upon the rapidity with which the mass of heavy and light artillery may progress during the battle.

(2) "Complete trench and wire systems are not to be destroyed; important points therein are crushed and breaches are made at those points; similarly fire is not conducted against a wood or a village but against definite parts of such wood or village."

Nevertheless, the length of the artillery preparation is still great; the Instruction places it at from one to five or six days, although a limiting the preparation to or effort at neutralization would allow it to be greatly shortened.

Thus the Instruction of 16 December, 1916, sought success much less by surprise than by the power and speed of the attack which it attempted to reconcile with the necessity for preconception, that is to say, for method. This attack is no longer the violent attack of a single impulse, such as the Instruction of 16 April, 1915, conceived; this attack is to consist of the organization of non-limited successive attacks, each of which is to be pushed as far as circumstances will permit until penetration into open terrain may be secured; but the artillery still plays a preponderant part, the delivery of the assault still being subordinated to the results secured by the preparation.

However, the infantry is again to be stimulated by initiative as a result of action. The command, while still making every effort to economize effectives, is very correctly guided towards "A taste for risk, which alone can produce important results"; in fact, war by its very essence is a game in which at certain periods in order to make big gains we must know how to take big chances; here is where the Instruction of 16 December is differentiated from previous Instructions; for the first time it brings out strongly the importance of exploitation, which up to this time had been somewhat neglected and which it completely studies.

But, to be able successfully to exploit success there must first of all be available a hard fitting infantry, it must have audacity and must be trained not only to occupy terrain but also to crush the resistance which it meets, that is to say, to fight, it must be infantry to which a large part of initiative is to be left as in open warfare.

Next, the artillery must sidetrack fast enough so as at all times to be able to support its infantry without forcing the infantry to make long halts.

Finally, there must be available means of liaison certain enough and fast enough to be able to switch the fires of the artillery at the request of the infantry according to the circumstances of the battle.

It was because the last two of these conditions could not be adequately fulfilled that up to the end of the war there was the greatest difficulty in putting exploitation of success into practice.

Finally, the Instruction of 16 December sums up in its last lines all the experience which had been acquired in these terms;

"No matter what the form of battle may be, inspiration should always be sought from the following principles:

"1st. In any defensive situation, hold the front with a minimum of automatic rifles and machine guns in the first line; keep the largest possible force in reserve;

"2nd. In the offensive never risk infantry against organized points without preceding the attack by a violent preparation;

"Economize the infantry; absolutely prescribe all dense formations;

"3d. In every situation, insure close liaison between the infantry and the artillery, even to the disadvantage of a slowing up of the action."

CONCLUSION. -- In this period, as in the preceding period, we see the two notions of Method and Rapidity struggling for the ascendancy. Nevertheless, the experience which had been acquired in two years had born fruit and our offensive procedure, after passing through many vicissitudes, ended up by an adaptation to the requirements of position warfare, of which we now had a more definite conception. The Instruction of 16 December, 1916, in spite of

certain impositions, was able to play a phase of the battle of the artillery, able to see, we must prepare through, a plan is to regain access to the of 16 December phases and of

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certain imperfections, clearly defined our offensive method and equitably proportioned between the infantry and the artillery the roles which these arms were to play in battle. Up to this period we had hardly looked beyond the phase of breaking through the fortified positions, in which phase the role of the artillery must be preponderant (as in siege warfare); but we must be able to see, indeed we must look far ahead, if we wish to obtain great results. We must prepare for the phase of exploitation following that of the break through, a phase in which the infantry, audacious and imbued with initiative, is to regain in open terrain the preponderant role which it had temporarily ceded to the artillery. The great merit which will rest with the Instruction of 16 December is that it exposed the particular characteristics of these two phases and crystallized ideas relative to exploitation of success.

Although we were still handicapped by the penury of rapid fire heavy artillery, the judicious use of existing means and the lessons drawn from experience allowed us to contemplate the rupture of the hostile fortified front with confidence. However, in order to get the full benefit from the new methods, it was to be necessary to make mutually dependent combinations of an offensive action, that is to say, to maneuver, in such a way as to gain strategical surprise, which up to this point had not been considered.

Furthermore, prolonged position warfare is a poor school for infantry; in this school the infantry learns, and we practically teach it, that it can do nothing without the assistance of the artillery; the Instructions of January, 1916, so informed the infantry and those of October, 1917, were to reiterate it with still greater insistence. Nothing more was needed to diminish in that arm, which had already been so sorely tried, its confidence in itself, its dash, its hard hitting qualities, in a word, its offensive spirit, which, however, is so indispensable in battle. It is true the command made an effort to rekindle the ardor of the infantry by periods of instruction passed in camps; but the front which the French Army then held was too great and rest periods were too rare to allow all the large units to be given such training.

The operations of this period again brought out the importance of surprise, which was the principal cause of the initial success of the Germans at Verdun and lack of which was the cause of the final failure of the Somme offensive.

But the most certain result secured by these different offensives still consisted in the usure of the enemy; we have shown that in attacking not only do we insure the retention of the initiative in the operations, but we also force the defender to wear himself down more than we ourselves are worn down, however, we must be clear on this question.

It is true that in the beginning of an offensive, particularly when we are able to take advantage of surprise, the attacker suffers less losses than does the defender; but from the time when equilibrium is reestablished, that is to say, where the defense has available means which are practically equivalent to those of the attack, the usure also tends to become equalized on the two sides (1); indeed the advantage is often on the side of the defense, whose very purpose is to inflict heavier losses on the attacker than those which it suffers itself; but in order to produce this result the defense must have escaped surprise, it must have had at its disposition adequate means and organized terrain; this is exactly the situation of the defense as soon as it is again able to reorganize after the initial success of the attacker. From this

(1) The losses in the battle of the Somme which, at the end of July, amounted only to 28000 killed and 40000 wounded, a total of 68000 men, reached 65000 killed and 150000 evacuated, that is, 195000 men at the end of August, and 114000 killed and 205000 evacuated, or 319000 men in November.

It is thus seen that the losses become higher in proportion as the offensive is prolonged within the interior of organized positions when the break through is not quickly produced. The same fact will be witnessed in the Aisne offensive of April, 1917.

moment on, the attack (against fortified positions) let it be well understood that it can only add to its losses without hope of producing any great results. (1) From this point on, another solution must be sought; it will be found in cover, which will again create surprise and will reendow the offensive with its superiority over the defensive.

A new condition for success had been added to those which we already know, that is, the mastery of the air; it was secured by the Germans at Verdun, and by the Allies on the Somme, thanks to the development in aerodynamics.

Finally, the union of arms is from now on assured by really practical methods of liaison, particularly between the infantry and the artillery.

Only a beginning had been made in the use of toxic projectiles; but the results which had been obtained by their use indicated the important place their use was to take in tactical combinations.

On the other hand, the defense had made great progress; to the growth of the power of the attack, it had opposed a new tactic which was based not upon the echelonment of positions, but on disseminating and echelonment of forces in depth; it was seeking a parry to the dangers of penetration by the offensive and surprise use of reserves outside of the zone of the hostile bombardments.

Furthermore, the enemy was in a different situation; his army, which cruelly feeling the crisis in effectives, had exhausted itself in the unsuccessful attacks against Verdun and particularly in the defensive operations on the Somme; it was at this point (12 December, 1916) that Germany for the first time made overtures for peace, which seemed destined principally to quicken the energies of the governments, the armies and the peoples of the Entente. On the side of the Allies, they were to reach their maximum in combatants; the year 1917 therefore seemed to be about to open under happy auspices for them, but the new tactics employed by the defense and the changes in the French High Command which were under way were to be their undoing.

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- (1) Examples: the French attack of 18 June, 1915, in Artois following that of 9 May; the attack of 6 October, 1916, in Champagne following that of 25 September; the German attacks at Verdun after 25 February, 1916, and the Allies' attacks on the Somme after 4 July, 1916.

CHAPTER V

THE YEAR 1917 -- EXTREME SOLUTIONS

As far as the nature of the operations conducted by the Allies are concerned, the year 1917 can be divided into two distinct phases:

-- a first phase, corresponding to the Anglo-French spring offensive, in which audacity had the ascendancy over all other considerations;

-- a second phase, corresponding to limited objective offensives of the second half of the year, in which prudence was sought above all other considerations.

I -- FIRST PHASE

The joint Anglo-French offensive in Artois and on the Aisne (9 April -- 15 May, 1917). -- I. -- The Preliminaries. -- The Instruction of 16 December, 1916, had hardly been signed when General Joffre was replaced by General Nivelle at the head of the French Armies (17 December). The Government hoped it had found the man who, with the help of some new process, would succeed in breaking in the German wall and in rapidly ending the war. Furthermore, the Allies had at their disposition a numerical superiority over the enemy of about thirty infantry divisions, and war material was beginning to come out of the factories in great enough quantity. It was imperative to prevent the enemy from retaking the initiative of operations as he had done in the spring of 1916, and particularly not to wait until the economic crisis which was predicted for the summer of 1917 should be added to the difficulties which had been created by the long war. Thus everything urged that the war should be quickly gotten over with. Furthermore, had not the Commission of the Army of the Chamber put forth the opinion that for political, economic and moral reasons the war "could not and should not be prolonged beyond the Summer of 1917?"

The offensive which General Joffre had projected contemplated two successive attacks; one, the principal, to be delivered on 1 February, between Oise and Arras; the other, less important, towards 20 February, between Soissons and Rheims, the latter to take advantage of the success secured by the former. But this plan was revised by General Nivelle, who wished to change the principal effort to the Aisne; the attack on the Somme still remaining the first attack to be delivered, but now being intended to attract the hostile reserves in that direction rather than to produce a break-through. This change naturally resulted in revision of preparations which required further delays to such an extent that the date of the offensive was postponed from February to April.

These plans, it will be seen, were based on the system of multiple attacks intended progressively to absorb the opponent's reserves, and no longer on the system of simultaneous attacks on a single front extended as far as possible. The point was that because of the great number of effectives at our disposal, each attack could be developed over a front which was so wide that we no longer had to fear concentration of fire and of means by the enemy; these special conditions were finally to permit us to effect a maneuver without which it is truly difficult to secure strategic surprise. In place of a single and brusque attack pushed straight to the front, as in 1915, or attacks repeated on the same front until penetration into open terrain should be secured, as in 1916, we now see the appearance of the idea of maneuver which we have already mentioned; the first attacks should attract and use up the hostile reserves, while the later attacks, profiting by this result, were to more easily produce the break-through. The closer in time that these multiple and non-simultaneous attacks follow each other the more chance will they have for success; this presupposes the availability of materiel and effectives in sufficient quantity so that effectives and materiel must not be taken away from the first attacks to provide the means for the succeeding attacks.

General Nivelle's plan was in the midst of preparation when the enemy injected difficulties into it by a countermaneuver. Really fearing the raging of a new

battle of the Somme, the Germans had to gain time, in the first place, to wait for the effects of submarine warfare which had been launched 1 February, and in the second place, in order to reconstitute reserves and stocks of munitions; to accomplish this they were to effect a broad and deep withdrawal to the Hindenburg position which was to be executed in the beginning of March. This movement not only was to have the advantage of shortening up the front by about 40 kilometers, by eliminating the vulnerable salient of Noyon; but also to place the Allies in a devastated zone which would be unsuitable for the offensive. On 4 February, therefore, the order was given to the Crown Prince of Bavaria to execute the plan of systematic destruction which had been given the conventional name Alberich. On 17 February the withdrawal in the region of the Ancre began under the pressure of the English; a month later, 16 March, it was extended farther to the south over a vast front as far as the Oise and even beyond the Oise (1). This fact led the commander-in-chief to reduce the magnitude of the French attacks north of the Oise in order to concentrate his principle effort upon the Aisne and to have the group of armies of the Center cooperate in this attack. The offensive was to be delivered from the north to the south; the English attack on 9 April, the attack of the group of armies of the north on 12 April, that of the group of armies of reserve on the 16th, and that of the group of armies of the Center (IV Army) on the 17th. Thus, contrary to the original project, the operation, properly speaking, is to consist of two attacks, the English attack and the Aisne attack.

To these causes of failure (postponement of the offensive, revision of plan) still others were to be added. Without speaking of the difficulties which General Nivelle met with in the exercise of his command, the plan of attack of one of our armies on the Aisne fell into the enemy's hands sometime early in April. No surprise could now be hoped for; the opponent had all the time needed to bring up his reserves, so that on 16 April he was to confront us on the Aisne with a number of infantry divisions equal to our own (2). Furthermore, he was able to reconstitute by that date a reserve of 44 infantry divisions, that is, two and a half times what he had at his disposition on the Somme on 1 July, 1916. If in addition to these difficulties we consider that the terrain selected for the principal offensive was particularly difficult and was poorly adapted to the combined use of the arms, and that bad weather progressively interfered with the artillery preparation (which lasted nine days) to a great extent, it is not astonishing that the great offensive of 1917 was not crowned with complete success.

However, the aggressive attitude of the Allies, as on the Somme, was destined to prevent the Germans from putting into effect their project of a general counter-offensive. In fact, Ludendorff had contemplated the possibility of a counterattack along the whole front, as he said "for the purpose of compensating the acknowledgment of weakness, which our withdrawal had been, by a great tactical success; but our effectives and the condition of our troops made it impossible to place into action on impracticable terrain sufficient forces to insure real success." And he

(1) It was after their withdrawal to the Hindenburg line that the Germans commenced to use in their counterbattery, no longer zone fires, but, as we had taught them, methodical fires, that is, precise, observed and controlled fires, as laid down in their Regulations of the latter part of 1916 on position warfare. Our IIIrd Army was the first to suffer from this after the pursuit to beneath the walls of Saint Quentin, where its artillery, having no cover available in this devastated terrain, was particularly vulnerable.

(2) It thus seems that the French high command did not pay enough attention to the information of the enemy, who completely changed his situation. Full of confidence in the ardor of its own troops, the French command was naturally inclined (like Falkenhayn for the Verdun offensive) to underestimate the power and value of its opponent.

adds: "During the withdrawal the troops of the Entente followed very closely. To them this movement appeared as a great success. But we had so skillfully influenced the press that this opinion could not be widely disseminated." In fact, the acknowledgment of weakness constituted by this withdrawal of the enemy was not well understood either in Germany or in France. In France, however, it increased confidence in success.

II. - The conception of the Commander-in-Chief, based on rapidity. -- Urged to terminate quickly position warfare and animated by an ardent faith in the success and the ability of his troops, the Commander-in-Chief had in mind, above everything, rapidity and continuity of execution. Not only did he show himself a partisan of the Instruction of 16 December, 1916, but he still further accentuated the audacious and rapid character of that Instruction.

The break-through was to be executed at a single blow, by means of a violent attack, within 24 or 48 hours.

The artillery preparation was to take place simultaneously over the whole depth of the enemy's organized zone, the howitzers being pushed as far to the front as possible, but was to take all the time and care that might be desirable for destruction (1). During the phase of the break-through there were to be no new artillery preparations which would require the forward displacement of batteries.

The infantry attack, once launched, was to be pushed through rapidly and by a continuous movement; but nevertheless was to be made up of phases and necessary halts for reorganization and for passage of lines.

The break-through being thus obtained by a violent and rapid action, an audacious exploitation to the front and flanks was to be instituted without delay for the purpose of establishing a bridge head, under the cover of which the troops intended to engage the enemy's reserve forces were to be concentrated.

Thus the offensive was to consist of three periods; the break-through, lateral exploitation to the front; but method was to be observed in respect to everything connected with the detailed preparation of these various operations, while speed was to be the preponderant factor in execution; on the one hand, the break-through, and on the other hand, the exploitation were to be intrusted to different troops.

In addition, the withdrawal of the Germans led the Commander-in-Chief to issue a reminder upon certain rules for the conduct of battle which the troops had a tendency to lose sight of as a result of the long periods of stabilization. Maintaining or regaining contact was to be an automatic operation, to be regulated by regimental commanders, or, at the highest, by division commanders in case the intervention of artillery became necessary. No more time was to be employed in the very rapid preparation of attacks than that required for getting the artillery into action. For, "the heavy artillery has become a field warfare weapon. We must be able to use it like the 75, and to get it into position and to open fire with it with equal speed." Finally, "the constant, orderly, methodical and rapid thrust naturally leads to a return to the battle methods of open warfare, which should result in a break-through. As we approach the general offensive, we must definitely break away from the inertia and the slowness which the excessive prolongation of trench warfare has introduced into our combat methods (2)".

(1) The tanks were to be employed in accordance with the principles laid down by the general order of 1 January, 1917, which for the first time established rules for their employment; either in surprise attack without artillery preparation, in which case the tanks were to precede the infantry; or after an artillery preparation, in which case, the tanks were initially to follow the assault troops over the torn up zone and were to be engaged only in taking the second objective. The tanks were employed in accordance with the second method during all of 1917, the limited gapping qualities of medium tanks not allowing the attempt at surprise attacks.

(2) Letter forwarding the Instruction of 16 December dated 28 December, and Note of 26 March, 1917.

This time the notion of rapidity and continuity was sharply in the ascendant over the notion of method; by suppressing the halts forced upon the attack by the forward displacements of artillery a very simple solution of the problem had been solved. The conception of the commander was thus an extreme solution in the direction of audacity and rapidity; in a way it took us back to the methods laid down in the Instruction of 16 April, 1915; but times had changed,

Fortification had undergone considerable development to the advantage of the defense; and, although our effectives had reached their maximum, our materiel (particularly the rapid-fire heavy artillery) was still not in sufficient proportion to insure to the attack the superiority in means needed for rapid success. We had seen that the enemy had adopted defensive tactics capable of hampering in any attack at penetration, if he had the time to get his divisions of intervention into position.

Everything therefore indicated that the battle for a break-through, particularly if it was not to have the advantage of complete surprise, would develop over a great depth; under these conditions was it not to be feared that an initial artillery preparation, no matter how deep it might be, would be inadequate not only in effectiveness but even in range, and were we in a position to assume before hand that no new preparation would be necessary as the advance progressed?

Finally, as to the troops themselves; in spite of very elevated morale and the confidence in success, were they, after more than two years of position warfare, sufficiently prepared and trained in the methods of open warfare?

The Instruction of 16 December, 1916, therefore, seemed sensible when, in spite of rapidity and continuity of the advance, it foresaw that the break-through phase might be made up of several successive attacks and several artillery preparations.

III. - Review of the offensive of April, 1917. -- The Allied offensive was launched as planned. That of the English, in the region of Arras, started on 9 April with success; after six days of fighting on a front of 24 kilometers, it had penetrated to more than 8 kilometers within the German organizations and had attracted to itself effectives equal to double those which had held the front prior to 9 April.

The group of armies of the North attacked on 14 April, but it ran into the Hindenburg position upon which it could make no impression.

The attack of the group of armies of the Reserve, initially set for the 14th, was postponed to 16 April on account of bad weather; after an artillery preparation of nine days, it was launched on a front of 40 kilometers, and nearly everywhere it carried the German first line; but it was almost immediately blocked by reserves in position.

Finally, the group of armies of the Center, in its turn, attacked on 17 April on a front of 16 kilometers; it captured important positions and broke up all the counterattacks which were made against it; this was a limited but very appreciable success.

IV. - The results. -- These offensives did not produce the terrifying breakthrough that had been expected; but, nevertheless, they obtained important results. From the 16th to the 20th we captured 21,000 prisoners and 183 guns. Nevertheless, starting with 21 April and in spite of the favorable dispositions of the English, the French command gave up the idea of a break-through and limited itself to efforts at wearing down the enemy's reserves by means of limited objective attacks. Part of the successes were thus obtained by the English as well as by the French until 15 May, on which date offensive operations were suspended.

And, however, from the end of April certain indications of usure could be noted on the part of the enemy. Of the 44 infantry divisions which he had in reserve at the beginning of our offensive, on 22 April he had only 16 left, and on 25 April only 12, and by 4 May all of them had been engaged. The Allies, on the contrary,

11 had 30 infantry divisions. The English asked only for more chances for success on our efforts. The run would be a defensive operation. It was opened in France.

It seems that the German command and more particularly Joffre had perhaps to undergo such a considerable ordeal of everything, all of it and the enemy followed by profound doubt. It did not seem to be made a success, were considered and 95,000 wounded; but what was the result of putting an end to the attack of 9 April? It was dangerous for the English were not to continue the tactical days; it is a width and more than 9 April upon the unassailability; he had a good opinion for the good fortune of the Anglo-British offensive campaign was. Thus, in spite of encouragement became tenacity. Further more difficult, it was.

V. - Conclusion
The attack was followed by the attack of pieces of heavy and 1350 pieces. They had not stopped (105, 155 H). The appearance of obstacles.

On the other hand, the enemy, was.

It was in the battle and made their the terrain was the observation of the English; it was with them, it produced, so that the English had a great number of divisions attracted and laid down in the.

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still had 30 infantry divisions available (16 French and 14 English), and the English asked only to continue. On 19 April, Sir Douglas Haig wrote: "I consider the chances for success this year to be remarkably good provided we do not let down our efforts; and that it would be neither wise nor judicious, but in the long run would be more costly in men and money to make an early suspension of offensive operations." Since the situation seemed so favorable, what then had happened in France that caused the offensive to be terminated?

It seems that the decision to suspend the offensive may be charged to the Government and more generally to members of parliament, who, since the exit of General Joffre had been much more fully admitted into the Zone of the Armies; they absorbed perhaps too great confidence in success from contact with our high leaders, although such confidence was needed by the troops to enable them to confront the terrible ordeal of the assault. And along with them, public opinion, which magnifies everything, already visualized a deep break-through, the crumbling of the front and the enemy in rout. In addition, the enthusiasm of the first day was followed by profound disillusionment when it was learned that the break-through could not be made at a single blow and that the losses, as they always are in such a case, were considerable; again, as usual, at first they were exaggerated: 25,000 killed and 95,000 wounded, whereas in fact they did not exceed 15,000 killed and 60,000 wounded; but nevertheless, the impression had been made and, without considering what was happening on the enemy's side, thought was at once directed towards putting an end to such butchery. For Ludendorff has written with reference to the attack of 9 April: "The situation was extremely critical and might have become dangerous for the whole front in case the enemy should follow up his action. But the English were satisfied with their great success, and in any event on 9 April did not continue their attack. The 10 April and the following days were very critical days; it is not without effort that a breach of from 12 to 15 kilometers in width and more than 8 kilometers deep is successfully stopped.....A day like that of 9 April upsets all calculations." And the French did not cause him any less uneasiness; he gave the order to begin the evacuation of Laon and already prepared opinion for serious eventualities. He himself says that he was to owe the good fortune of his situation only to the inaction of the Russians during the Franco-British offensive, and to the lowering of morale in French, where the defeatist campaign was in full sway.

Thus, in spite of the confidence and the energy of the command, dissolution and discouragement became dominant at the very moment when there was the greatest need for tenacity. Furthermore, the Commander-in-Chief, whose position had become more and more difficult, was replaced by General Petain on 17 May.

V. - Conclusion. -- The great offensive of 1917 marks a new increase in power deployed by the attack; on the Aisne, on a front of 40 kilometers we had available 2000 pieces of heavy artillery (700 of which were modern), 172 high powered guns (GPF) and 1650 pieces of trench artillery. Thus the development of our heavy artillery had not stopped, and was tending to become modern by the apparition of new materiel (105, 155 Howitzer, Model 1915, rapid fire 228, 280, etc....) and by the disappearance of obsolete materiel (95, 120, 155 Howitzer).

On the other hand, upon the Aisne, our aviation, very much interfered with by that of the enemy, was not able to insure the mastery of the air.

It was in the battle of 16 April that our tanks (82 Schneiders and Saint Chamond) made their first appearance, but, however, under unfavorable conditions (1); the terrain was decidedly torn up and soaked; as our slight penetration had left the observation posts in the hands of the enemy, the tanks became an easy prey for his artillery; finally, as our infantry was little accustomed to operate in liaison with them, it did not know how to profit by the momentary advantages which they produced, so that their sacrifice was to a great extent wasted. In spite of

(1) The English had already made their first use of tanks on the Somme, but they were inadequate in number and the infantry did not know how to operate with them. Thus they only attracted the attention of the Germans to means of opposing them, which they laid down in their Regulations of the end of 1916.

this regrettable check, it was not difficult to foresee that this new engine of war was to be most effective against the obstacles of fortification; their utilization in mass was, moreover, to allow the artillery preparation to be reduced in duration or even to be eliminated altogether, and consequently more easily procure surprise. Fortified by their success on the Aisne, the Germans luckily retained to a degree skeptic with respect to their new means of action in infantry combat; when they came to understand all the importance of such action, it was too late!

The employment of toxic projectiles had given good results, but we still did not know how to get the maximum effect from them.

The complete absence of surprise, which marked our offensive, was an element of success for the defensive tactics of our enemies, which, particularly on the Aisne, they found entirely satisfactory; however, they were not slow in noting that their defensive tactics was not infallible.

As on the Somme, our losses became greater in proportion as our offensive was prolonged within fortified positions (1).

The Instruction of 16 December, 1916, had not been applied; it had hardly appeared when it was modified, neglected in its provisions for method and exaggerated in its provisions for audacity. Furthermore, no conclusions with respect to this Instruction could be drawn from the offensives of April, 1917, against which too many causes of failure were combined. Nevertheless, as we shall see, the inevitable reaction, which was to follow what was already being styled the check of the Aisne, was directed against the procedures laid down in the Instruction of 16 December.

Finally, the forward movement, which followed the German withdrawal upon the Hindenburg position, brought out the importance of communications in offensive operations; practical lessons were drawn from it with reference to preliminary measures to be taken for the rapid reestablishment of routes, regulation of circulation, the forward movement of artillery, which were to be very useful in future offensives.

On their side, the German situation was not as brilliant as it seemed. The hopes which had been based upon the crushing of Roumania had not fully come up to their promises, while the front to be held had still further developed. Finally, in order to meet the crisis in effectives, the last resources of the territory had to be called upon in order to create 13 new infantry divisions. The disintegration of the Austro-Hungarian Army was a permanent menace; the declaration of submarine warfare had drawn the United States into the conflict on the sides of the Entente (3 February, 1917); finally, the Russian revolution (15 March, 1917) did not at this time seem too particularly favorable to German interests.

In spite of our dissolutionment of April, we therefore had no reason to face the future with apprehension.

*(1) The first offensive on the Aisne cost us 15,000 killed, 20,000 missing, 50,000 wounded, that is a total of 96,000 men. At the end of May the losses had risen to 65,000 killed or missing and 110,000 evacuated, that is a total of 175,000 men; and at the end of July to 87,000 killed or missing, 169 evacuated, a total of 256,000 men.

II. -- SECOND PHASE.

OFFENSIVES WITH LIMITED OBJECTIVES.

This second phase includes the second half of the year 1917; it is marked by a radical change in the object to be sought, and in consequence in the procedure to be employed. Before the battle of the Aisne both sides were generally convinced that nothing but a military victory could terminate the war, that neither of the belligerents would give up the fight until constrained and forced to do so; and that the economic, financial and political difficulties, which had for a long time been discussed, would always be insufficient to produce a decision. Up to this period, the Allies then in all their offensives had sought to break through the opponent's front, but had never been able to secure this result. After the battle of the Aisne they gave up the effort to break through the front and limited themselves to offensives which were called "with limited objectives".

This radical change was justified by the difficulties of the situation. At the time when General Petain took command of the French Armies, the termination of the great offensive of the Aisne was looked upon as a check; at the rear, opinion, already disturbed by the occult intrigues of the enemy, was in a riotous state; very soon this condition of inquietude and mistrust was to spread to the front. The French soldier, the Poilu (to use the consecrated term), whose heroic role had perhaps been too exclusively lauded, without giving credit to the no less important one played by the command and the staffs, which alone could lead him to victory, was inclined to think himself everything, and that his sacrifices were being cheaply held; and certain units, very few in number, it is true, attempted to mutiny. Faced by such a danger, the maintenance of discipline in the army was urgent; this was the first task which was imposed upon the Commander-in-Chief and it must be admitted that he acquitted it with a tact and firmness, which do the greatest honor to his qualities as a leader and as a military psychologist.

In the second place, after the failure of our last attempt to break-through, it was absolutely necessary that we should not give up our efforts; while, at the same time, we could not run the risks of suffering fresh set-backs. For the Commander-in-Chief estimated that the spring battle of 1917 demonstrated a state of equilibrium on our front which our reserves although they were superior to those of the enemy, were not capable of modifying in our favor. To launch a new enterprise upon a grand scale, it was imperative to be realized until the spring of 1918 at the earliest, particularly by the support of the American contingents. Until then it was a question of wearing down the enemy, to block his aggressive initiative, to keep him exhausted by means of local operations; which procedures were to allow our army to hold on, were to elevate its morale and fortify its confidence.

Hence, the Directives of the Commander-in-Chief.

I. - The new Directives of the Commander-in-Chief. Method again takes the ascendancy over rapidity and continuity. -- The new Directives of the Commander-in-Chief laid down the principles which were to be stated and developed later in the Instructions of 31 October and 20 December, 1917, on offensive and defensive operations.

In order to wear down the enemy and at the same time reduce our own losses to a minimum "attacks in depth, which are costly, uncertain, and which do not result in surprise" must be abandoned. Therefore, action was to be taken by limited objective attacks, launched with violence upon as wide a front as possible and prepared in every detail.

They were to be staged with the maximum of artillery, and with the greatest possible economy in infantry, and were to be launched by surprise which urgently required the offensive equipment of the greater part of the front (1). They were to be put on successively in different sectors which were of importance to the

(1) Thus we find reappearing the idea which had already been put forth in the Note of 20 May and the Instruction of 22 October, 1915.

enemy to hold and were to follow each other as rapidly as possible in order to hold him in position and to deprive him of liberty of action.

For these attacks the following were set forth in principles:

That the ensemble of our batteries was not to be displaced during the course of the action;

That, limited by the possibility of the destruction of our own artillery, it is always important to strive for the capture of the enemy's batteries;

That offensive works should not sensibly change the appearance of the sector which were then to be left dormant for a certain period in order to deceive the enemy;

Finally, that efforts to secure power should not decrease the effect of surprise by an excessively long artillery preparation and by slowness in getting the means into position. With the great amount of large caliber rapid fire material available, we could now proceed simultaneously to place a great number of batteries in position and to the execution of many adjustments; furthermore, massive counter-battery action was to be supplemented by the intensive employment of toxic projectiles, but "especially during the execution of the attack".

Thus, the preparation could be accomplished with greater rapidity. Furthermore, the command was now to be responsible for the length of the preparation: "He must know that the complete destruction of the hostile organization and particularly the complete destruction of batteries is an utopia; he must not, therefore, in order to get rid of his responsibility, ask of the artillery what it cannot give him. He must be able to determine what his infantry attack requires, if necessary, to modify the poorly considered requirements of the latter and, once the necessary destruction has been accomplished and verified, he should, without further delay and with an elevated sense of his responsibility, consider the preparation as accomplished and decide upon the assault."

On the other hand, these same Directives took into account that the enemy might attack; therefore, we must prepare to meet such eventuality by constantly improving our defensive organization; furthermore, work done to provide for the offensive equipment of the front was to serve for this purpose to a great extent.

The object of such defensive organization was to allow any sector which might already be attacked or which might be threatened by attack to be reinforced within the minimum time with order and method. Hence, the necessity for a simple and flexible plan of reinforcement, providing for rapidly putting into action a powerful and coordinated artillery force, and for a suitable echelonment of infantry, and finally, for placing in position considerable available means for counterattacks and reliefs. Thus, the eventualities of the defensive as well as the eventualities of the offensive require the rapid transportation of reserve means (artillery and large units) by rail and by motor. Hence, the requirement to establish in advance a plan of transportation of reserves.

In addition to this, in order to increase the number of such available forces in case of attack, each army was required to establish a plan of withdrawal of forces, the purpose of which was to reduce to a minimum the effectives charged with holding a sector which might not be threatened.

The Commander-in-Chief likewise contemplated the case in which the enemy might voluntarily retreat, as he had done in March, 1917; and he directed the attention of the armies to the necessity for collecting every indication of withdrawal and for maintaining close contact, particularly by the execution of frequent raids. Each of them was to prepare for its movement in advance by the establishment of a general plan, to which the same plan of pursuit was given. Definite indications were pointed out on the composition and mission of advance

wards, on the role of the main body and on the importance of rapidly reestablishing communications.

Finally, to fulfill the different missions imposed upon them, the armies had to be able, except during critical periods, to count upon a definite assignment of forces. The Commander-in-Chief, therefore, established, in principle, a theoretical allotment of means of all kinds among the groups of armies. But, he added: "this allotment should allow them, by their own means, not only to insure the safety of their fronts and to prosecute the work of equipping the offensive sectors, but also the instruction and rest indispensable to the reconstitution of large units..... These periods of instruction and rest are required by the troops for their material reconstitution, the maintenance of their offensive aptitude and moral vigor," and the high command, properly concerned with this question of very first importance, consequently prescribed the execution of certain measures, particularly with reference to instruction periods. These were the object of a special directive, Directive No. 2 of 20 June, 1917.

These Directives, which were very sound in the difficult situation in which the French army then was, applied a radical solution to the problem of rapidity and of continuity in the execution of attacks; in the case of limited objective offensives, since the infantry no longer had to progress beyond the zone beaten by its own artillery, the question of necessary halts for the forward displacement of batteries now did not even have to be considered.

On the contrary, in such operations against near objectives, method could be applied without any hindrance whatever; there was in fact nothing to prevent prearrangement from being pushed to the extreme limit, the slightest actions of the combatants being prescribed from the beginning to the end of the action. Properly speaking, they were operations in siege warfare, providing for the methodical capture of a certain number of intrenchments and in which every contingency, everything of the unforeseen, was considered; in purpose as well as in the methods to be used, they represented a system which was diametrically the opposite of that which had been previously employed, particularly the one for the offensives of April, 1917. We may therefore say that from this point, method assumed the ascendancy over rapidity and continuity, which became of second consideration.

However, in these Directives we see the reappearance of the idea of surprise which had for so long been neglected; thanks to the offensive equipment of the front and to the possibilities of maneuver which resulted therefrom, surprise is to regain a part of primary importance. This equipment, the Commander-in-Chief said, "is really intended to place us in condition to maneuver with flexibility and speed both offensively and defensively." Furthermore, surprise was to be facilitated by the speed with which the last preparations could be executed, speed in getting the means into position, and by the rapidity of the artillery preparation.

Finally, these Directives have a triple character which is particular to themselves. First they reflect the sense of organization and of method of the Commander-in-Chief and in a way they constitute a charter for the armies in the field; offensive and defensive organization of the front, allotment of the front, allotment of means among the large commands, employment of troops both in sector and in reserve, deeply studied prearrangements both for attack and defense, the constant concern to provide the troops with all the well-being compatible with the necessities of instruction and discipline; such were the principal points covered therein; they were so logically knit together that the presence of an enlightened control, which knew what it wanted and which took action accordingly, was actually felt. The French army, now organized in accordance with the special situation with which it was confronted, was in condition to face the different eventualities which might occur, without having to resort to improvisations which always depend upon uncertainties from this particular point of view incontestable progress had been made over all that had been previously done.

In the second place, the Directives of the Commander-in-Chief were of a secondary character; they were addressed only to the higher echelons of command; and, at least as regards everything concerning operations, they should not have been made known to the troops. Unhappily, on 7 July, our Minister of War announced to the Chamber that from then on we abandoned all operations on a grand scale and would attempt only limited objective attacks. This was a statement which not only was useless and perhaps detrimental to be given to our troops, but which was bound to be fatal for us in that it reassured the enemy at the very time when his morale was beginning to weaken.

Lastly, all the prescriptions upon operations, and particularly the system of limited objective attacks were only of a temporary character. This conception forced so to speak, by the particular situation which the Commander-in-Chief was obliged to face, could really be entertained but temporarily; otherwise, we should give up all idea of gaining a decision by arms; furthermore, he said, "if the situation of equilibrium becomes changes, other directives will be issued."

II. - The reaction against the Instruction of 16 December, 1916. The Amendment (1) of 27 July, 1917 to that Instruction. -- The Amendment of 27 July, 1917 made a certain number of restrictions upon the Instruction of 16 December, 1916; they also injected into it some new ideas.

As to the restrictions, we must note:

1st - The suppression of the introduction, that is to say, the Note of 27 November, 1916 which summed up the lessons drawn from the battle of the Somme and which oriented the command towards a broader conception of operations;

2d - Even the title of the Instruction was modified: it was now not only a question of general offensive actions, but of offensive actions in general; and this because the command might set for itself two different purposes in its attacks: either it might wear down the enemy, or it might indeed strive for the break-through, "if the general situation allowed such result to be considered." However, it remained understood that even in the battle of usure contemplating limited objectives, the idea of exploitation was not to be lost sight of. Furthermore, the whole chapter on exploitation of success was retained without modification;

3d - The conception of the battle of the break-through was the object of the greatest restrictions. It took on the form, as in January, 1916, of a series of assaults each of which was always to succeed the other as rapidly as possible, "but each of which was to be prepared by the preliminary combination of all the means, and particularly by a powerful artillery action."

The objectives to be taken were to be determined in accordance with the limitations of the artillery action; they were to be made up of the ensemble of organizations upon which the artillery preparation could be directed before the attack and upon which the artillery preparation could be continued during the advance without displacement of batteries (and no longer either with or without displacement of batteries). In reality, "if displacement of artillery is necessary to insure support for the infantry, the attack should consist of several phases in the interval of which the displacement of artillery should be made."

Thus we come back to objectives limited in advance; consequently to successive attacks, put on, it is true, as rapidly as possible, but separated by more or less long halts which do not permit the realization of continuity;

4th - Lastly, the remainder is given that at all times, during the battle as well as during exploitation, the uninterrupted support of the infantry by the artillery must be insured. Nothing is to be attempted by the infantry unless it can secure the profitable action of the supporting artillery. The division commander must be able, not only to effect the concurrence of his own artillery to the action of his infantry, but he must further be able to secure the support of the corps artillery and even that of neighboring large units. Hence the necessity and importance of liaison; on the one hand, between the infantry and the artillery,

(1) Le Rectificatif.

and on the other hand, between neighboring large units. During the execution of the attack the infantry is to be required to inform the artillery of the positions which it occupies and of those of the enemy, while the artillery on its side is obliged to go after this same information with its own means.

The new ideas introduced by this Amendment may be summed up as follows:

1st - The idea of maneuver which inspires every plan of action is no longer to be based upon considerations of power and speed, but:

a. - On the situation of the enemy and on a deep study of his organizations and means;

b. - On efforts at surprise effect, "which is secured by the collection as rapidly and as secretly as possible of the means to be employed and by their preparation into sudden, violent and effective action;"

c. - On the special terrain features, which might require the capture of certain zones before certain others and thus result in attacks being not simultaneous.

2d - The front of attack was no longer to be simply as extended as possible, it is to be strictly in accordance with the infantry and artillery forces available. The depth of the attack was to be determined, not only by the possibility of artillery action, but also by the capacity for penetration of the infantry, which is limited (1). As a guide "in general it may be assumed that the battle front of a battalion will vary between 300 and 400 meters and it will have a limit of penetration which may be as high as from 500 to 1000 meters. Offensive possibilities must be calculated upon these bases." Consequently, the battle front of the infantry division might vary between 1000 and 1200 meters.

The result of all this was that the Amendment of 27 July, inspired by the Directives of the Commander-in-Chief, presented analogous characters; even in operations upon a grand scale, method assumed the ascendancy over rapidity and continuity which the Instruction of 18 December, 1916 had attempted to reconcile. Leaving aside the question of exploitation of success, we were going back to the ideas contained in the Instructions of January, 1916, which however had been tried out.

Thus the battle was to be composed of successive attacks carefully prepared by the artillery and having objectives defined in advance; instead of being composed of phases which should be limited only by the resistance encountered. Under these conditions, the capture of the hostile artillery could no longer constitute the principal aim of the attack; it was mentioned only that "whenever the amplitude given to the attack will permit it, it is of advantage to get as close to the hostile batteries as possible, in order to capture them, to destroy them or to force them to withdraw, so as to disorganize the hostile artillery system."

The need for economizing the infantry led to a more minute regulation of its employment, and to consideration of its offensive capacity in determining frontages of attack and objectives to be attained; on the other hand, this same need called for constant and effective artillery support of the infantry. The role of the infantry, which the Instruction of 18 December had tried to augment, again fell back to one of a secondary order; on the contrary, everything was subordinated to maintenance of liaison, the importance of which was more and more insisted upon. Yet, to get out of the infantry all of which it was capable, its conditioning, both as to instruction, material and above all morale, seemed to be essential. "The troops must be led to wish to attack."

(1) Heretofore, the different instructions on the employment of infantry gave specific indications only on the attacking front of each unit, but not on their capacity for penetration, which had not been so closely estimated.

Efforts for surprise finally regained its place in the preoccupations of command, but the true means of securing it were no longer sharply apparent.

Nothing was changed, as we have remarked, in the chapter on exploitation of success; as a result certain prescriptions which it contained were badly out of agreement with the modifications contained in the Amendment on the subjects of exercise of initiative and the development in the executants of the taste for

By the restrictions which the Amendment of 27 July imposed, the road had been taken towards the Instruction of 31 October which, under the influence of memoirs of 16 April, was to go still much farther in the same direction.

After the battle of the Aisne, were we not too hasty in concluding the failure of the methods contained in the Instruction of 16 December, 1916, which in fact had been modified before they had been applied?

III. - The limited objective offensives of the latter part of 1917. -- The object of these operations was the reduction of the Messines salient, south of Ypres, taken by the English (7 June); it was executed by twelve infantry divisions, of which nine were in first line, on a front of 15 kilometers, with the support of a very strong artillery force. After an artillery preparation of ten days, the British infantry took three hostile positions over a depth of five kilometers without suffering heavy losses. The Germans, who were expecting the attack, however, had been reinforced, but their artillery was practically silenced by that of the English. A dozen hostile divisions were more or less used up in this attack, while the British army secured a good base of departure for their next offensive.

The Flanders offensive (31 July), executed by two British armies (V Army, Gough; II Army, Plumer) and one French army (I Army, Antoine), was more than a repetition of the battle of the Somme, but one which, instead of aiming at a break-through, was limited in purpose to reaching a certain line (Steenback River and ridges to the southeast) by successive efforts each of which had quite limited objectives; it was a repetition of the battle of the Somme, but with increased means, especially in artillery, aviation and tanks.

Delivered on 31 July on a front of 25 kilometers, after numerous raids and an artillery preparation of fifteen days, the attack met with complete success; but rain interrupted progress from the first day and allowed the enemy to reorganize.

During the following four months, the English delivered no less than six offensives, but without being able to take their final objective. In fact, very much slowed up by unfavorable atmospheric conditions, their efforts were interrupted by long halts, of which the enemy took advantage to reorganize and to react by numerous and violent counterattacks.

Nevertheless, these successive thrusts on a total front of 36 kilometers had taken three German positions over a depth of from 6 to 7 kilometers; and had forced the Germans to engage nearly 60 infantry divisions, which were beaten, Marshall Douglas Haig said, by half that number of English divisions. So that, although the English did not attain their objective, they at least, Ludendorff wrote in his Memoirs, "inflicted upon the German armies losses such as they had not heretofore suffered."

The offensive of 20 August north of Verdun was for the purpose of completely freeing the center of communications at that place. The preparations lasted three months; thus the enemy, who had noted them, had ample time to reinforce; he had available a total of eight infantry divisions in front line, five infantry divisions of intervention in rear and 280 batteries. On the left bank of the Meuse he was holding his first line whose density of occupation was very great, at all costs; on the right bank, however, the observation posts being much farther to the rear, the defense based on the play of counterattacks in depth, was to be made on a position of resistance with an outpost line of observation in front of it.

The attack was on a front of 15 kilometers, with the support of a very strong artillery force. After an artillery preparation of ten days, the British infantry took three hostile positions over a depth of five kilometers without suffering heavy losses. The Germans, who were expecting the attack, however, had been reinforced, but their artillery was practically silenced by that of the English. A dozen hostile divisions were more or less used up in this attack, while the British army secured a good base of departure for their next offensive.

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The Malmaison salient of Laffaux was taken by the English (7 June); it was executed by twelve infantry divisions, of which nine were in first line, on a front of 15 kilometers, with the support of a very strong artillery force. After an artillery preparation of ten days, the British infantry took three hostile positions over a depth of five kilometers without suffering heavy losses. The Germans, who were expecting the attack, however, had been reinforced, but their artillery was practically silenced by that of the English. A dozen hostile divisions were more or less used up in this attack, while the British army secured a good base of departure for their next offensive.

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The length of the front was to be extended to 25 kilometers, with the support of a very strong artillery force. After an artillery preparation of ten days, the British infantry took three hostile positions over a depth of five kilometers without suffering heavy losses. The Germans, who were expecting the attack, however, had been reinforced, but their artillery was practically silenced by that of the English. A dozen hostile divisions were more or less used up in this attack, while the British army secured a good base of departure for their next offensive.

Finally, our observation posts being much farther to the rear, the defense based on the play of counterattacks in depth, was to be made on a position of resistance with an outpost line of observation in front of it.

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12/2/29-hkk

The attack was delivered by four corps (two on each bank) having, on a front of 17 kilometers, eight infantry divisions in front line supported by a considerable artillery force (1). The artillery preparation lasted six days; 187 hostile batteries, out of 280 which had been located, were taken under fire for destruction, while their neutralization by special shell was begun only six hours before the assault. The results were that on 20 August and the following days, the German artillery reaction was extremely feeble.

The offensive, broken up into several phases in order to reach objectives about from 2 to 4 kilometers distant, developed for two days according to plan. The Germans were out-distanced by the attack on the right bank and could not bring their counterattack troops into play; these were used to set up a barrage in rear of the three front line infantry divisions, which had been disorganized by the attack. TheASURE was so great that, beginning with the 23d, the enemy had to call upon seven new infantry divisions in order to hold the front. The counter-attacks which he attempted were powerless to modify the situation, to such an extent that the number of German infantry divisions used up in this operation could be evaluated at 24.

The Malmaison offensive (23 October) was made for the purpose of reducing the salient of Laffaux and to throw the enemy back on the Aisne, so as to make it impossible for the enemy to reconquer the lost ground. But, forewarned of our intentions from early in September, this enemy had had all the leisure to bring up reinforcements; he had available on the front of attack six infantry divisions in first line, three infantry divisions of intervention and three infantry divisions in reserve, supported by 180 batteries. He was so well informed that he was to know the day and even the hour of the attack; luckily that time at the last moment was advanced by 30 minutes. Orders had been given to defend the first lines at all points to the end.

The offensive was executed on a front of 10 kilometers by three corps having seven infantry divisions in first line and with a stronger artillery force than ever: 1850 pieces of all calibers, representing a mean density of one gun per 6 meters of front (2).

The length of the artillery preparation, which was at first set at four days, had to be extended to six days on account of bad weather. This density, heretofore unequalled, resulted in turning the German first position into a veritable field of shell holes to a depth of from 400 to 800 meters. Interdiction fires, which greatly bothered the enemy, contributed strongly to success. For the first time the neutralization of the hostile artillery was started during the progress of the preparation that is, during the night of the third to the fourth day, thereof, progressively diminishing its action which became very feeble during the attack and for the two days following.

Finally, our aviation, master of the air, insured nearly absolute protection to the observation service.

(1) Mean density: one gun per 7 meters of front, that is one 75 per 23 meters (and even 20 meters in some places); one howitzer per 36 meters; one heavy gun per 33 meters, one trench gun per 30 or 35 meters (for flank divisions only).

It is therefore seen that, although the infantry forces were practically equal, we had a decided superiority in artillery over the enemy; in fact, there were more artillerymen than infantrymen in our attack divisions. Each assault battalion was supported by two groups of 75's, which amounts to two normal division artillery components for one infantry division having only 3 battalions in front line (1200 meters).

(2) This density represents one 75 per 16 meters, one heavy howitzer per 25 meters, one heavy gun per 30 meters, one high powered gun (GPF) per 60 meters, one trench gun per 25 meters. Each assault battalion was supported by a little more than two groups of 75's, that is, three times the normal divisional artillery for one infantry division having four battalions in front line (1600 meters).

The battle lasted three days and brought us as far as the Oise-Aisne Canal slightly beyond the objectives, which were only from 3 to 5 kilometers from the positions of departure. The Germans withdrew everywhere and, during the night 1-2 November, they evacuated even the Chemin des Dames which was threatened in flank and rear. Success thus surpassed all expectations.

For the second time our medium tanks had gotten into action, but their employment having been the object of very complete preparation, the results were excellent; only five tanks, out of 60 engaged, were destroyed. Also confidence in the engines was not slow in re-awakening, and the sad memories of April were soon forgotten.

The Cambrai offensive (20 November) was made for the purpose of gaining a local success by surprise by selecting a section of the front which had been sufficiently stripped of troops. The artillery preparation was to be completely done away with, thanks to the employment of a large number of tanks charged with the destruction of the bands of wire during the actual assault; little or no preparatory works, but extensive use of camouflage; all movements to be accomplished at night and the placing of the means to be accomplished for the most part during the night preceding the attack; such were the methods used by the English to secure surprise.

If secrecy be well guarded, the enemy could not bring up reinforcements before the third day of the battle; it was necessary therefore, that the infantry secure possession from the very first day of the full depth of the hostile organizations (about 6 kilometers) and open the way for the cavalry, which would attack lines of communications and prevent the arrival of reinforcements. Consequently the operation was to consist of only a single and identical attack to be executed by the front line infantry divisions immediately followed by the cavalry. The English high command reserved to itself the decision to intervene to make a late exploitation of the breach, either towards the north with three infantry divisions of the neighboring army (V Army), or towards the south with the French detachments of General Degoutte.

The III British Army (Byng) attacked on a 16 kilometer front with two corps that is, seven infantry divisions, all in first line, each supported by a mass of 45 tanks (five to six companies of twelve tanks per attacking infantry division) and by 1030 pieces of artillery (mean density; one gun per 12 to 13 meters of front); in second line, five cavalry divisions.

The attack was launched at 6:30 AM without any artillery preparation, and completely surprised the enemy, who was easily overrun; but the British infantry advanced more slowly than did the barrage, which soon got far ahead of the infantry, then, tired out by that continuous advance, the infantry, beginning with the capture of the second objective, lost liaison with the tanks; also, in the decisive phase of exploitation, the means became dissociated and the action became disjointed. Furthermore, the enemy made successful resistance at several points and denied the exits of the position to the cavalry. The operation was conducted with too much haste and did not allow the first successes to be exploited.

On the 21st desperate attempts to conquer the points which could not be taken the day before were made; but without success. Nevertheless, the English high command decided to continue the operation, but the troops were exhausted; so the 22d was given over to rest and organization of the ground.

From the 23d to the 27th, the fighting became localized about a small number of important positions, which in the end the Germans held. This fighting absorbed the three infantry divisions intended for the widening of the breach, while the enemy continued ceaselessly to reinforce; in fact from the 22d on he brought into the battle one infantry division per day. Thus, if the English had been able to resume the offensive with a fresh set of divisions, according to the avowal of Ludendorff himself, the Germans would never have been able to limit the breach; therefore, it was the lack of depth in the attack dispositions which hampered the exploitation.

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On 30 November, the enemy in his turn assumed the offensive. In spite of retreat on a part of the front, the English command faced the situation with the most remarkable energy until 4 December, on which date it decided to withdraw its line.

During this battle of three weeks, if the English had not been able entirely to realize their projects, they at least still occupied a line which was located between 3 and 4 kilometers from their positions of departure. With their ten infantry divisions, they had completely disorganized at least three German infantry divisions and had forced the engagement of a dozen other infantry divisions, several of which had been intended to operate in Italy.

The lessons to be drawn from the limited objective offensives, which we have just discussed may be stated as follows:

The purpose which had been set was attained, namely; to wear down the enemy, to permit our forces to hold out, and at the same time to raise their morale and to reestablish their confidence.

They were dynamic actions, in which the artillery played the primary role, all of which exhibited the same characteristics:

a. - Predominance of method, to which nothing was opposed; everything was regulated in advance in a mathematical fashion by the most detailed plans, from which no one diverged (1);

b. - Incessant augmentation of the power of offensive means, particularly as regards artillery, aviation and tanks (2);

c. - Always a very long artillery preparation; in fact we continued efforts to effect as complete as possible destruction of obstacles in order to diminish the risks to be taken by the infantry; on the other hand, except at La Malmaison, neutralization of the hostile artillery was practiced only during the attack phase;

d. - As a result of the above, with the exception of Cambrai, there was complete absence of surprise, in spite of the fresh orientation in that direction which had been given by the directives of the Commander-in-Chief;

e. - Lastly, execution was facilitated, due to the fact that the artillery had to make very little displacement during the progress of the attack.

The result of this was that the battle developed, so to speak, mechanically, in accordance with the established plan; but that the exploitation of success was neglected, because it was not believed possible to foresee the time and place where it would be possible.

The conclusions which the executants themselves draw from these operations deserve to be stated.

(1) This predominance of method was one of the causes of the lack of success of the Flanders offensive, just as it was of the insuccess of the Somme offensive of 1916.

(2) At Messines (7 June), the English had an average of one gun per 18 meters, one infantry division per 1600 meters of front; and at Cambrai (20 November) one gun per 12 to 13 meters, one infantry division per 2000 to 2500 meters. Likewise, at Verdun (20 August), the French had one gun per 7 meters, one infantry division per 2000 meters; and at La Malmaison (23 October) one gun per 6 meters, one infantry division per 1500 meters of front.

1st - The usure of the enemy, which is the primary purpose of such operations, presents a delicate problem, the solution of which we are not always sure will be to our advantage. To make sure of success, as is stated in the report of the II Army after the operation of 20 August, "we must plan to take a complete system of organizations and to throw the enemy back on to a different ensemble of organizations which shall be entirely divorced and as distant as possible from the first system. This is an essential condition to produce a definite situation to give us time to recognize and not to be at the mercy of continual raids from an enemy who remains too close to us." The point is that we must actually take into consideration "not only the costs of the operation itself, but particularly the costs which will result from the reactions of the enemy." Thus, in the attack of 20 August, "in order to effect a saving of one infantry division on the right bank, we were led to reduce the front and depth of the attack and to give up the idea of pushing to the Wavrinville. As a result of this, it was impossible to bring about a sharply defined situation in that area or even to effect the beginnings of an organization; in the region of the Bois le Chaume the lines occupied by the two opponents on the same terrain feature were so close together the battle never ceased. Although we saved one infantry division on 20 August, two and a half months of continuous bombardment, attacks, raids and stagnation in shell holes have already held up at this same point six infantry divisions, without any results."

Thus, operations which meet with the greatest initial success may create points of friction and sometimes may cause numerous subsequent battles, in which both sides become equally used up. Undertakings of this kind are quite delicate; the terrain and the choice of objectives play a very important part in them. Before embarking on them, all their possible consequences must be deeply studied, and battle must not be started unless we believe superiority can be maintained; it is only on this condition that we may hope to wear down the enemy more than we will ourselves be worn down. The offensive of La Malmaison, which contained all these favorable conditions, is proof of this.

2d - Success may be capable of greater exploitation than was generally counted upon. This situation may be the result of the disorganization which the enemy suffers either from the effects of a very powerful artillery preparation, as at Verdun or at La Malmaison, or from the effect of surprise, as at Cambrai.

In fact, General Fayolle wrote, with reference to the attack at Verdun, "J day must be made to produce all that is in it; it is the day of maximum returns. On that day all conditions are at their best; trench artillery is available, munitions are numerous, the terrain is absolutely known, telephone communications are well organized. All these favorable conditions must be exploited to their utmost (1)".

At La Malmaison there had been foreseen particularly a lateral exploitation; this was accomplished, since the front, which was 10 kilometers wide at the start, measured 18 kilometers on J + 2 days. However, the report of the commander of the VI Army said, "the enemy's confusion, which was noted on the morning of the 25th, removed every risk from and advance as far as the canal. Likewise, everything had gone well north of the Ailette, as well as around Anizy and around Nonampteuil. But in this instance we were forced to improvise. It may therefore be concluded that, once the break-through has been accomplished, full

(1) "After a heavy preparation, the enemy is depressed, his liaison is destroyed and his command disorganized. The artillery is slow in delivering its barrage and executes them poorly, his counterbattery is weak on J day and remains almost inactive on the following days.

There is a feeling that he must undertake a complete reorganization and before he again gets in shape, there will be some hours which will be very favorable to daring enterprises. Therefore in drawing up our plans we must not fail to discount the opportunities of a period of some length, following the attack, in which the enemy will not be in possession of his means. We will thus anticipate audacious exploitation, in which, the artillery, if the terrain makes its displacement possible, can play a capital part, and which will be fruitful in happy results." "Report of the 16th Corps after the 20th August.)

complicated, full exploitation becomes possible, provided it has been foreseen. We must never be afraid of broad conceptions. Just because we have adopted far distant objectives, it is not certain that we will get there, but it seems even more certain that we will never take an objective unless we have previously prepared ourselves to do so."

Thus, even in operations with limited objectives, we must look ahead and prepare for the exploitation of successes obtained. These may greatly exceed our expectations and may offer un hoped for opportunities for results. In fact, we never know whether the attack which we are about to launch is not the one which will produce the decision; as stated in the instruction of 16 December, 1916, we must not allow ourselves to be surprised by success; to this we must be prepared for success.

3d - Efforts at the destruction of the hostile artillery before the attack is not indispensable; the neutralization of such artillery is sufficient. As we have noted, this was witnessed at the battle of La Malmaison, where, after three days of fires for destruction, the hostile batteries were still troublesome, while neutralizing fires, which started during the night of third and fourth days of the preparation, resulted in a very evident decrease in their activity. From then on, therefore, thanks to the use of toxic shell, destruction could be replaced by neutralization; in addition, this was to permit us to reduce the length of artillery preparation and to obtain surprise more easily.

4th - Lastly, the employment of tanks in mass at Cambrai, had demonstrated that surprise attack, heretofore considered to be impossible, is perfectly feasible. The tanks proved themselves redoubtable weapons, of great offensive value and upon which it was justified to rest the greatest hopes. At least this was the interpretation which was made in France of the results of the battle of Cambrai.

To sum up, the success of the limited objective offensives was due to the employment of formidable materiel. It would have been absolutely impossible to deploy materiel in the same proportion for an offensive on a wide front. However, the produced habits for which a taste grew up; securing easy successes, the practically complete suppression of unforeseen situations in the battle, the marked decrease in casualties (38,000 dead and missing and 129,000 evacuations between August and December) were all the more reasons for partiality to this system, in which the artillery took a more and more preponderant part. And so, the high command, which was not convinced that the rupture of the front could decide the war, was to consider this tendency in the new Instruction which was in preparation.

IV. - The Instruction of 31 October, 1917 on the offensive action of large units in battle. The triumph of method. -- The deductions which the executants themselves drew from the operations of the second half of 1917 should have inspired the editors of the new instruction then in preparation; curiously enough, they retained only certain of them and discarded the others. The tendency towards restrictions to be applied to the Instruction of 16 December, 1916, already noted with reference to the Amendment of 27 July, was actually to be accentuated to such a degree as to fundamentally modify the very conception of offensive operations.

This conception was based on the fact that the hostile defensive system was too deep to permit us "to think of making a breach in it, in a single effort, which should be big enough to produce a dislocation of the general disposition. As a result, offensive action will be characterized by successive attacks" with, first of all, definitely limited objectives (normal objective, intermediate objective, eventual objective), which shall be determined in accordance with the possibility of artillery action. These attacks will be very methodically conducted and are to be renewed and varied within the minimum of time and on as broad a front as possible, until they shall result in the dislocation of the

hostile fortified wall. "They are to land to operations with more distant and objectives in which the decision of the battle and the pursuit of the armies will be progressively considered." The series of hostile positions echeloned in depth will then be taken progressively, by a succession of objective attacks, whose purpose shall be to use up the enemy until the moment when giving way to such continuous pressure, he will be forced to fall back. It was the system laid down by the instructions of January, 1916, but the duct of the attacks was altogether different.

In effect, although the initial attacks had to be simultaneous in order to facilitate surprise and the capture of the first objectives, the later attacks were to be by broad adjacent zones, in which the assaults were to be delivered alternatively, so that the enemy should be threatened at all points. "Thus the necessity of limiting attacks in space and of echeloning them, in time, in no way excludes the advantage of continuity, the insurance of which is always of the greatest importance." Actually, in each zone the preparation of the successive attacks is a function:

- of artillery displacements, which can be made only during the halts;
- of the development of liaison and communications, of primary importance;
- of the advance of materiel and supplies;
- of the modifications to be made in the dispositions of the infantry;
- of the artillery preparation, or getting tanks into position.

Now, all these operations require a period of time; when a considerable advance has been made, this time will be all the longer. This is why, the instruction says, "in principle, each attack will be made only to such extent as corresponds to the capture of a single hostile position"; therefore, they should succeed one another more rapidly, that is, "separated only by a few days." The problem of continuity for the offensive as a whole is thus solved by bit by bit successive slices out of the enemy's dispositions, although it does not seem to be solved for any attack considered by itself (1).

This new conception of operations, based, as we have just seen, on method and continuity, was, furthermore, characterized by efforts at surprise, which had already been brought up in connection with the Directives of the Commander-in-Chief.

Strategic surprise was to be secured when the enemy could within adequate time "neither intervene with his general reserves, nor execute preventive maneuvers." (2) It is to be sought by maneuver, that is to say, by combination of attacks delivered at several points on the front, which will embarrass the enemy in the use of his reserves. For this purpose we must have available the greatest possible sections of terrain, each of which has been previously earmarked for an offensive; as we have already said, this was a return to the ideas laid down by the Commander-in-Chief in his Note of 20 May and his Instruction of 16 October, 1915.

As to tactical surprise, it "consists in surprising the enemy as to the exact time and front of attack and in submerging him by rapidity in execution so that he may not use either his fires or local reserves to good advantage." In the most favorable case, that is where tanks are available, by the total elimination of the artillery preparation. In other cases, every effort will be made to reduce the length of such preparation, by limiting it to the destruction of trenches and wire; as to the balance, in fact, the essential elements must be destroyed, "but efforts at their complete demolition are illusory." Under the

(1) Thus the idea of preliminary wearing down, intended to absorb the hostile reserves, induced the idea of non-simultaneous attacks; on the contrary, as we have seen, as long as we thought we could break in the front at a single blow the attacks would have to be simultaneous in order to keep the enemy uncertain as to the employment of his reserves.

(2) This corresponds to the period of preparation of attacks.

(3) This corresponds to the period of the execution of attacks.

conditions, the length of the preparation, which until now had been variable (the delivery of the attack having been subordinated to the results secured), could be calculated and determined in advance; to make up for the imperfections of this relatively short preparation, a great number of special shell was to be used at the time of the attack, to neutralize not only the hostile batteries which had not been demolished but also the means of defense. Division commanders were to supplement the lack of preparation "by neutralizing fires and by an attack mechanism, as a result of which the enemy might be surprised and taken in his works or shelters." And the Instruction states further: "The chances of success of an offensive are contained as much in surprise and neutralization at the time of the attack as in efforts at the complete destruction of hostile batteries, organization, or observation posts In some cases, efforts at strategic surprise may be the primary element in the preparation of an offensive action "

Thus we note a real tendency towards the reduction in the length of the artillery preparations, which the instruction, however, still estimated at three or four days; although the destruction of the hostile organization might be reduced, the destruction of the artillery was still considered "as one of the most certain guarantees of success". As before, its neutralization was contemplated only at the time of the attack, although experience at La Malmaison had proven that such neutralization, when begun during the preparation, gave excellent results.

Thus we had not yet understood that the use of toxic shell in mass during the preparation gave the means of substituting neutralizing effect for destructive effect and, consequently, of still further reducing the length of artillery preparations.

In all cases, preparations of all kinds were to be carefully camouflaged in such a way as not to attract the enemy's attention. Lastly, the most absolute secrecy was imposed upon all the echelons of command, the distribution of orders being limited strictly to the units or services interested.

It might be thought that a great part of the Instruction would be devoted to exploitation of success; after having so fully prepared for surprise, it would have been logical to have considered the means of fully exploiting its effects; furthermore, the lessons drawn from the operations of 1917 had shown that this was entirely possible, although not exempt from certain unforeseen hazards; but the Instruction of 31 October, 1917 attempted particularly to reduce them to a minimum. Furthermore, the Instruction makes exploitation the object of restrictions, which completely changed the character which the Instruction of 16 December, 1916 had given it.

In the first place, the term exploitation of success was no longer employed; it was replaced by that of development of success, which attenuates its extension.

In place of making it the object of a whole chapter, as in the Instruction of 16 December in which it was exhaustively studied, this important subject is covered in a dozen pages (of the 160 which make up the Instruction of 31 October).

(3) However, so as not to appear to completely reject the results of experience, the Instruction, to begin with, announces: "all armies will be ready to exploit the confusion in the enemy's general dispositions which is produced by offensive actions; at each phase of any offensive action, they must prepare the development of success which has been planned for or which has been counted upon." But in applying this, how many restrictions did it not place upon the initiative of the executants!

In the first phase, called "development of progress across organized positions", the advance, "prudent and methodical" beyond the eventual objective, was to be started only on orders from the army commander "who alone being able to see the full situation, was the only one able to decide upon his opportunity."

Its purpose was to be the widening of the initial breach, and was to be marked by halts upon the _____, which were not to be passed without orders from the army commander. When the field became more extended, the cavalry could play a part in this phase in maintaining contact with the enemy. The artillery would not be able to "assure barrages, as during the advance towards the normal or eventual objectives, and the true protection of the advance was to consist in the disorganization of the enemy, and in the seizure of his batteries. And that was the truth (1). In order to take advantage of favorable opportunities, it was not necessary to wait until all the artillery should be able to support the infantry; it should, however, the Instruction said "assure the covering of the ensemble of the most advanced elements."

In the second phase, called "development of progress in open ground", the advance, still controlled by the command, was to be characterized by greater rapidity of action, in which contact was never to be lost; it was in this phase that the large cavalry units were more particularly to find employment in advance of troops of all arms; the command was at all times to maintain the cavalry in condition to reconnoiter and to attack the enemy's halt positions.

The phase of exploitation or of development of success, it is seen, is no longer based on rapidity, but rather on method. This will naturally result in slower execution and almost complete suppression of all initiative on the part of subordinates. The role of the latter becomes limited to reporting to superiors the chances of success which a continuation of the operation might have, and of making all preparations in this direction, in case the order to continue may be given. If we can admit that successive attacks within fortified positions should be general and combined operations, ordered and conducted by the commander, it is difficult to extend that idea to the period of exploitation of success, where, in order to take advantage of favorable occasions, command must be decentralized and the executants must be given back their share of initiative.

This method, which dominates the execution, will be found again a fortiori in the preparation, which is to be as complete as possible and which includes the establishment of more and more numerous and detailed plans, which are reviewed and corrected at each echelon. Every disposition to be made in view of an attack is made the object of a plan; herein there is a real abuse, whose greatest inconvenience is to cause much loss of time at each echelon. Furthermore, such practice ended up in absolute centralization in the hands of the command, which alone was called upon to make decisions not only in the preparation of attacks but during the progress of their execution.

On the subject of the employment of large units, the Instruction of 31 October 1917 lays down the principle that they are to be combined in temporary groups having an offensive power in depth sufficient to conduct an attack from beginning to end (2000 to 3500 meters).

The corps (formerly the attack unit) was therefore to be a group made up normally of from 2 to 4 infantry divisions. The employment of the corps in square formation (2 divisions in first line, 2 in second line) is recommended as the formation which will permit all the necessities of battle to be met.

The division became the attack unit. Just as the determination of objectives was to be a function of the possibilities of artillery action, so the employment of the infantry division was to be decided by the offensive powers of its infantry, in taking the battalion (the combat unit) as a basis. For, "experience proves that in assault against organized positions, its useful battle front varies between 300 and 400 meters and its ability to advance varies between 800 and 1200 meters" (2). The division in square formation (3 infantry regiments

(1) These are the only passages of the Instructions in which some slight doubt is felt.

(2) The Amendment of 27 July stated: from 500 to 1000 meters. Furthermore, these figures were given only as a guide and might vary in each special case.

abreast, with 3 battalions in front line and three lines of battalions in depth) would thus have an offensive capacity of about 1200 meters of front and of from 2000 to 3000 meters in depth.

The employment of each arm in the different phases of battle was completely laid down; especially that of the air service, which was made the object of numerous prescriptions for the conduct of its missions of combat, observation and liaison. The importance assigned to its action strongly brought out the necessity for gaining and maintaining the mastery of the air which had become indispensable to the success of operations. In the same way, the role and employment of tanks was indicated with precision and in detail.

In addition, attention was constantly directed to the need for liaison, whose organization and functioning were now no longer entrusted to the officer in charge of liaison, but to Chief of Staff of each large unit. The maintenance and repair of communications were equally designated as being of capital importance, the progress of attacks depending directly upon the rapidity with which they should be reestablished.

Lastly, the Instruction of 31 October enumerated the essential conditions for success in an offensive action. In addition to efforts at strategic and tactical surprise, which we have already discussed; it mentions:

-- superiority in means, which results from superiority in effectives and in material (from which fire superiority follows); terrain features and atmospheric conditions;

-- complete preparation of conditioning the command and troops, by the establishment of plans, by the execution of offensive works (first stages of preparation), by the assembly of the means, and the execution of destructions (second stages of preparation).

To sum up: The Instruction of 31 October, 1917 consecrated the triumph of method over rapidity:

-- method in the preparation, where everything is controlled by plans, which were ceaselessly growing in number;

-- method in the execution, subdivided into successive attacks with limited objectives and set up in every detail;

-- method again in the first phase of the development of success, which was subordinated to the decisions of the army commander and conducted in accordance with preconceived ideas.

The idea of the offensive, such as resulted from the Instruction of 31 October, 1917 was an extreme solution in the direction of prudence and method, just as the idea evolved before 18 April had been another solution, but in the opposite direction, that is, in audacity and rapidity.

A constant preoccupation was felt to lessen the risks to be taken (1), no matter how much slowing up might be the result; no unit, large or small, was to be allowed to push forward as a spear-head; to this effect, very narrow limitations were to be placed upon the initiative and ardor of the executants and assent was to be given to an advance into the interior of the position only on a broad front, so as to be at all times ready to resume the battle in force. It was the voice of prudence and care which predominated; but in addition, what slowness in execution, even though the situation be very favorable; in other words, at the very moment when anxiety for speed should take precedence over all

(1) To reduce them to a minimum, the Instruction went so far as to imagine breaks in the time table for the purpose of coordination, a new and complicated mechanism, intended, as the advance progresses, to allow the anticipated halts to be prolonged, in case certain troops may not be ready to go on.

considerations! It was as much as saying that the lessons of the offensive of the Somme and those, more recent, of the second half of 1917 had been completely lost sight of.

We had gotten far away from the Instruction of 16 December, 1916.

The idea of dislocation of the hostile artillery system by capturing his batteries in the rush of the first attack had been abandoned.

In fact our offensive methods had become more rigid than ever.

The artillery was decidedly filling the principal role in battle.

However, the infantry was the object of very particular solicitude in everything that referred to its professional or moral value.

In a word, the Instruction of 31 October, 1917 was a return to the methods of the Instruction of January, 1916. It could therefore be said that, except for concern for maneuver and for the realization of surprise, which was real progress, it marked a backward step in tactics. Its greatest merit was to have codified the results of long experience in position warfare, but it had in mind, so to speak, only that form of war; it was therefore incomplete, and the methods which it indicated do not permit us to face the necessities of open warfare, in which moreover we hardly had any faith. And yet it aimed, like those which preceded it, at the dislocation of the hostile fortified front, which, once accomplished, was to be followed by battle in open terrain until a new organized position should be confronted.

It seems that we confused Directives which should be appropriate for issue to the high command to allow it to meet a temporary situation, and Regulations and Instructions appropriate for issue to all echelons of the hierarchy and which should establish the methods to be used in order to obtain the decision, that is to say, the capture of the opposing front. The more we study the Directives of the Commander-in-Chief, which gave a special and provisional form to operations with a view to holding on and wearing down the enemy, as long as the equilibrium on our front should last, the more we are unable to understand how the high command could believe, after lessons of Verdun and the Somme, in the efficacy of such operations to produce the dislocation of the hostile front. The Instruction of 31 October, 1917 built up a system which should have held the authority of an expedient, of a temporary make-shift.

The result was that, for many minds, the rupture was thenceforth impossible and that war took on a new form which was characterized by limited objective attacks and reduced exploitation.

On the other hand, this Instruction confirmed the persuasion of the infantry that it could do absolutely nothing without the assistance of a powerful artillery force. This is true in position warfare, but it tends to lower the infantry's offensive spirit and battle value. This idea, so essential was it, certainly should have been brought to the knowledge of commanders of large units; but it was really dangerous to give it to the troops, in whom confidence in their own means should have been maintained to a greater extent considering the fact that those means they had just been very much increased.

V. -- The defense of positions. -- 1 -- On the German side, the defensive doctrine established by the Regulations of the end of 1916 were completed and perfected on 1 March, 1918, particularly as regards the employment of reserves, the artillery (counterbattery) and anti-tank defense.

The results obtained during the progress of the battles of April-May, 1918 were entirely satisfactory to the Germans. Yet the Imperial Crown Prince prescribed certain perfections to be applied to the methods used. On the other hand, these battles of material and crushing fires built up in the German army a

current of opinion which was hostile to field fortification, which only served to draw shelling and are invariably destroyed.

Ludendorff had to combat this tendency citing the actual results of experience. Hence, the new dispositions contained in the Annex of 10 June, 1917 to the series of rules for position warfare:

1st - As the strongest works are ultimately destroyed by the bombardments, more and more numerous, deep and complex positions must be available; and in order to keep the attacker in ignorance of the location of the principal line of resistance, "the heart of the resistance", force his artillery to disperse its fire and waste its munitions, better use of camouflage must be made. In fact, we must not go so far as to say, with certain ones that the construction of positions should be given up (1). The more works there are, the more objective will the adversary have to fire upon, and the more ammunition will be expended; a wide zone fortified in depth must therefore be prepared."

In all cases, during the battle no effort is to be made to reestablish the forward trenches, but only to join up shell holes, in order to form a line, which, after the battle, was to be looked on only as a line of outposts;

2d - As the attack was striving to take the mass of artillery with the first day's impetus, the principle of echelonment in depth should apply to the artillery and minenwarfers as well as to the infantry and machine guns;

3d - As the losses suffered were still considerable, the infantry was to be echeloned in depth to a still greater extent; only a few men were to be left in the front lines, which were generally to be considered as forward positions; however, the reserves were to be sufficiently close up, but without increasing the density in the forward zone.

On the other hand, during the battle the troops (infantry and artillery) must be used with more mobility; the Infantry must not be required to submit to the hostile fire; "as far as possible it should act spontaneously, with initiative and, in a sense, offensively", by moving towards the least beaten points, preferably by moving towards the enemy in open terrain. "In this way it will conduct the battle with less losses and to better advantage; the result will be to raise and strengthen its morale."

Lastly, "there are scarcely any points of terrain which must be held at all costs. There are a series of points which we believed we could not give up in any case and which we had to resign ourselves to lose, after having made numerous and useless sacrifices. In such cases an opportune and voluntary withdrawal executed in accordance with orders does not effect the morale of the troops; while the arbitrary retention of points which have evidently become unfavorable, shakes its confidence in the command." But it remained well understood that until superior authority has announced otherwise, the duty of troops is always to hold the terrain which has been confided to it by an active defense, in which immediate counterattack plays the greatest part.

Finally acknowledging the impossibility of holding the first trenches, torn up by an intense bombardment, and in addition, being forced to economize in effectives and munitions, Ludendorff decided that "the battle in and for the first line has become the battle for the first position."

In the use of reserves, too much infantry was assigned to the execution of counterattacks in first line divisions. Likewise, in the divisions of intervention it would often be adequate to engage only a part of the strength in order

(1) "Battle and continuous communication trenches, good wire and good shelter are the only means which will allow reduced effectives to hold a position in normal conditions of position warfare; even when battle is raging, they are indispensable to insure cohesion, shelter and supply of troops in second line, particularly when the first lines have been transformed into shell hold positions. Furthermore, only a well prepared position forces the enemy to make extensive preparations, to engage large forces and to make use of special means."

to reestablish the situation, instead of throwing them into the battle completely and as a single force (1).

Finally, the counteroffensive was not to be ordered unless the importance of the results expected justified the losses expected.

The artillery was still further to economize in ammunition and was sent taking up the question of precision fires, that is "fires for destruction executed calmly and well adjusted by observers and methodical fires for annihilation, which support the infantry much better than do automatic barrages, which use up an enormous amount of ammunition for a minimum result." When an attack is expected, the artillery take every means to destroy the hostile batteries, interfere with the preparations of the attacker, and then annihilate the assault troops by adjusted, precision and observed fires.

On the whole the German defensive doctrine had undergone slight evolution since the end of 1916; the greatest change over earlier ideas was that the defense should no longer fight to hold the first line of its vicinity, but to hold the first position. This was all the more practicable as the works were already in great depth; it was the French conception which had been adopted after Verdun.

Thanks to these methods the German high command expected to sustain defensive battle with economy, but its tactics were soon countered by the Allies' use of limited objective attacks. In the battle of Flanders, particularly, the German first lines, which were weakly held but were completely riddled by a long bombardment, were readily captured; the very heavy barrages and box barrages which accompanied the assaulting troops prevented the delivery of well prepared counterattacks (2); they were pinned to the ground or broken up before they could gain their objective; deep organizations were thus taken piece by piece, while the defense was powerless to interfere.

Confronted by this situation, the local command (17th German Army) thought it could break away from the principle of echelonment of forces in depth, by, in advance, locating near the front all the infantry, required for the defense of the first line and the first position; this was a return to the methods of 1916, at which time the purpose of the defense was to hold the foremost trench. But from October on, it was noted that the only change that this method made in the results was to increase the losses.

However, from the beginning of the battle of Flanders, Ludendorff had been struck by this situation; he writes: "The enemy had adapted himself to our tactics of divisions of intervention; attacks with distant objectives, like those attempted by General Nivelle, at the time of the battle of Aisne-Champagne were no longer in favor with him. He had penetrated the secret of our counterattack, and his reaction consequently was to set a certain limit to the exploitation of his success." The remedy appeared to him more than ever in the principle of the echelonment of positions and of forces in depth, and he published a new Regulation of 15 August, 1917.

This Regulation stated, "Battle should be conducted, not about lines, but within battle zones". This was a much broader idea than the idea of a position it implied, on the one hand, the solidarity of the organs of defense (infantry, artillery, minenwarfer, liaison, communications, supply), and on the other hand

(1) While in April, 1917, these divisions were engaged in one blow in open terrain with all their infantry and light artillery (as at Guignicourt, Amfion), they intervened in 1918 as detachments usually made up of one infantry regiment, one group of artillery, each of which was normally assigned a sector of intervention.

(2) It is to be noted that the air service, charged with searching out the enemy reserves, was of great service to the artillery; sometimes it bombarded these assemblies by its own means.

the idea of the echelonment in depth of the defense and of the battle, The terrain was therefore to be organized into successive battle zones, several kilometers in depth, and separated by a distance of at least 3 kilometers, with the double purpose of:

-- providing the command with greater security in case of a rupture of the front;

-- forcing the enemy to prolong and to repeat his preparations for attack. The distinguishing features of this organization of terrain were: 1st - a first zone, or covering zone, held by outposts intended to repulse all surprise attacks and to give the alarm while delaying the enemy;

2d - A second zone, or main battle zone, the zone of principal resistance, where the enemy's attacks, even the most violent, must be stopped. The main body, which is charged with the defense of this zone, would suffer less from the bombardment because of their distance from the front, and, nevertheless, would have time to occupy its positions;

3d - A third zone, or rear battle zone, which was to protect the reserves intended, either to counterattack in the main battle zone, or to stop the enemy in case he should break through the main battle zone.

The artillery was to get its main protection from the enemy's fire by its mobility (numerous alternative emplacements provided with shelter). "In battle or for special missions, the use of unprepared emplacements will often be advisable." The same was to apply to the minenwerfer.

By this new organization, Ludendorff thought he had dispelled the danger of the break-through, and that, in any case, he would force the enemy to wear himself down. The covering zone was really of advantage "because it forces the enemy in taking it to engage considerable forces and means, which he will lack when he comes to the principal attack. As his advance proceeds he will encounter difficulties which constantly increase in number and which constantly become unexpected", and will have to arrange several successive attacks before breaking through. These principles were applied during the last days of the battle of Flanders, but their principal use was as a guide in the construction of the new Megfried, Brunhild and Hunding positions.

2d - On the French side. -- From the end of 1916, the French defensive doctrine had scarcely changed, but it had been perfected and codified, like the offensive doctrine, by the Regulations and Instructions of the Commander-in-Chief.

General Nivelle, in his Note of 10 March, 1917, on the occupation and defense of the front, had already republished their essential points (1); but General Petain was the first to combine all the prescriptions on the defensive into two complimentary Instructions:

The Instruction of 20 December, 1917 on the defensive action of large units in battle;

And the Instruction of 23 August, 1917 on the organization of the terrain for the use of troops of all arms.

The Instruction on defensive action was issued after the Instruction on offensive action of 31 October, 1917; battle should in effect, "be composed of

(1) "The defensive, no more than the offensive, is not conducted by the use of gas as weapons". Hence the necessity for the echelonment of forces in depth, ensuring the infantry's succession of efforts particularly by movement, while the artillery places its efforts to assist the infantry more in counteroffensive preparation fires (O.P.O.) than by barrage fires.

closely connected defensive and offensive action"; according to the Directive of the Commander-in-Chief, the first served to prepare the second by the material and moral usure which they caused to the enemy.

The fundamental principle of the organization of the defense was echelonment in depth; echelonment of organized positions, and echelonment of the forces intended for their defense.

A defensive organization was always to be made up of at least two positions, sometimes more, at such distance from each other that they could not be submitted at the same time to the same artillery preparation (6 to 8 kilometers). It was to be understood that intermediate and switch positions might be established between the different positions.

A position was to be made up of a certain number of connected centers of resistance, formed by the combination of strong points, the elementary unit of the organization of the terrain being constituted by the grouping corresponding to an automatic arm, or combat group. All these elements were naturally to be nested in a general network of trenches, parallels and communication trenches.

"In order to escape the effects of artillery fire and aerial reconnaissance the essential elements of the defense must be dispersed, they must be detached from the visible lines of the defense and they must be dissimulated to the greatest possible extent. But such dispersion makes it more necessary than ever that there be a studied allotment of the means of the defense and good organization of command."

Thus the Instruction of 23 August, 1917 which condemned the uniform distribution of forces along continuous lines of trenches, adopted organization by mutually supporting centers of resistance, but from which passive intervals between centers of resistance have disappeared. Furthermore, with this Instruction there began the period of camouflage.

But the great innovation was the combat group, which became the skeleton of the defense. Before the war the tendency was to group complete units within strong points in order to facilitate supervision and the exercise of command. Experience had proven that, in modern battle, the action of the chief of section alone can make itself felt, and that not always upon all his section; but that the combat group can always be effectively commanded by its leader.

Finally, the lessons drawn from the battles of 1916 and 1917 led to pushing actively the construction of the third positions and to increasing the distance between the positions; 6 to 8 kilometers instead of from 5 to 6.

Just as the artillery was to be echeloned in depth, the infantry was to be divided into:

Local security detachments (1) located to make the defense, in place, of the line of observation and of the principal parallel;

Main defensive garrisons, (2) to insure the defense of the strong points and centers of resistance;

Support troops, in rear of and near the troops on guard, to deliver immediate counterattacks;

- (1) troupes de garde.
- (2) garrisons de surete.

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Troops available, or reserves farther to the rear, ready and warned for general counterattack or counteroffensive, which even to be prepared and accompanied by artillery or tanks.

The conduct of the defense was to be essentially active, whence the expression defensive actions, contemplating at all times the destruction of the enemy's active works and the preparation of battle (1). "The fundamental principle is that defensive actions should never constitute dispersion of effort and of means; concentrations are required at all points and at all times, for they develop the maximum power of the defensive." The principal method of action of the infantry, in the defensive, as in the offensive, is always to be in movement.

As before, the position upon which resistance is to be definitely made is to be determined by the high command, "because it alone is capable of ordering the general form of defense to be adopted In the event of a very powerful attack, he may decide to accept battle only on the second position."

This position being determined, the principal parallel "will constitute the line of resistance of the troops on guard and the normal objective for counterattacks by the troops in support or in reserve echeloned within the position. The determination of its location is of the greatest importance; and will usually be a responsibility of the army commander."

In order to avoid surprise, which is the great danger in the defensive; and, in spite of the effects of bombardment, in order effectively to resist the assailant, it will be necessary:

- to develop the service of collection and exploitation of information;
- rationally to organize the terrain as a function of an idea of maneuver;
- to prepare the conduct of the defense by numerous provisions (plan of defense, of reinforcement, of transport, of withdrawal of forces, etc).

Lastly the roles of the different arms, particularly of aviation, anti-aircraft defense, and antitank defense, were to be studied in the light of the principal cases which might come up.

At almost the same time as the Instruction on defensive actions, there appeared the Directive No. 4 of the Commander-in-Chief, dated 23 December, 1917.

In case of a major hostile offensive, the scheme laid down was:

1st - To hold the first positions in such a way as to break, or at least to slow up and disorganize, the enemy's first impetus;

2d - To devote to the defense of these first lines only the means necessary to make adequate use of the organization; and, in any case, to guarantee the deployment of the main body on the second positions and on the switch positions, whose integrity must be assured;

3d - To use the available troops, not only in the enemy's zone of penetration, but also in counteroffensives either directed against the flanks or against a part of the front adjacent to that zone.

The general reserves themselves were to be employed either to reinforce the armies which were being attacked or in a counterattack in a locality and in a direction which might be considered favorable.

(1) Experience of the war clearly demonstrated, as the Note of 5 December, 1915, had already stated, "that the only defensive methods now applicable are fire and counteroffensive, the passive defense having lost all its value. Furthermore, the Manual for the Chief of Section very properly states that "trench warfare is neither a truce nor guard duty, it is a phase of battle. The opponent must feel that he is confronted by a vigilant hatred and know that we wish no rest before his defeat."

The high command was to be ready to "limit the consequences of a powerful surprise attack to the loss of our first lines and to confront the enemy with full initiative by giving to the defense a decidedly aggressive character."

Thus, it was the second position, whose integrity was to be maintained at all costs, which in principle was to be selected as the main position of resistance; another step had been taken in the direction which had been indicated by the instruction of 20 December, 1917, which Instruction had viewed such solution as being only an eventual one. On the other hand, and for the first time, we note the appearance of the idea of replying to the offensive, not only by as active as possible a resistance, but also by attacks, either in a neighboring sector or in any other direction which might be considered favorable. It was the idea of maneuver, applied to the defensive, in the same way as it should be applied to the offensive, and which was to be the richer in results in proportion to the certainty with which it would produce surprise.

A month later, the Commander-in-Chief committed himself more fully in the ideas which he had outlined for the general conduct of the defensive. His Instruction of 24 January, 1918 for the application of Directive No. 4 in reality replaces the idea of successive positions by the idea of the army battlefield (1)

"The army battlefield is the ensemble of organized terrain upon which it is the mission of the army to halt and defeat the enemy. The essential element of this battlefield is the position of resistance So selected that the enemy will be able to attack it only after a series of combats whose results shall have disassociated the assault dispositions of his infantry and the initial scheme of his artillery." For the enemy, this position should be more or less an unknown factor; and if either a part or all of it falls into his hands, the army commander must use every means to retake it.

"The ground extending from the army position of resistance to the hostile front therefore constitutes the army commander's margin of security for bringing his forces into battle Consequently, the divisions which happen to be in sector when a hostile attack is launched will have essentially to fulfill a covering mission. At that time, the disposition of each of these divisions will be one in depth in the advance zone of the army battlefield in such a way as to:

"Make the maximum exploitation of the defensive capacity of organization and use of terrain;

"Take advantage of the distance separating the hostile front from the position of resistance;

"Thus insure the time necessary for placing the reinforcements (infantry, artillery) responsible for halting the enemy on the position of resistance."

It is seen that our defensive doctrine has followed the same evolution as that followed by the German defensive doctrine, but six months behind the latter. The idea of an army battlefield corresponds to the idea of the combat zone; both of these ideas are based upon the impossibility of an indefinite defense of the first lines and even of the first position; and tend to push the true zone of resistance (zone of major battle, and army position of resistance) farther to the rear; it is to have in front of it a covering zone whose mission is to slow up the attacker; to dissociate his attack, if possible, and to allow reinforcements to come up. This was a return to the conception of field service (regulations) as regards security in position, that is to say, the role to be played by outposts, which position warfare had threatened us to lose sight of.

(1) In reading Directive No. 4 and the Instruction for its application, we are struck in finding therein the same ideas that were expressed in the Note of 5 December, 1915 previously referred to; only the terminology was different; a proof that general principles persist in spite of tactical evolution and changes in armament.

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VI. - Conclusion. -- To sum up; the second part of the year 1917 had witnessed a further growth in the power of the means brought to bear both by the attack and by the defense, and notably:

a. Artillery, particularly heavy artillery which was beginning to include a marked proportion of rapid fire guns; the density of artillery deployed for an attack continually increased until, at the battle of La Malmaison, it reached the proportion of one gun per 6 meters of front; this proportion was not later surpassed;

b. Aviation, had increased to a considerable degree; it had become not only an organ of command, observation and liaison, but thanks to its pursuit and bombardment squadrons, a combat arm.

c. Tanks, now to be used in mass; these constituted a new and very powerful means of action; their introduction is to mark a transformation in offensive procedure. In fact, they permit the suppression of the artillery preparation (Cambrai), and consequently permit the almost certain attainment of tactical surprise, and even to some extent, strategic surprise.

From now on this new element will have to be taken into account; an element of which happily the Germans had not yet fully realized the importance.

d. The use of toxic shell in large masses, which should permit the destruction of active works of the enemy, which up to this time had been sought for, to be replaced by the neutralization of their personnel. It is to be noted that the Germans had commenced the use of a new product, yperite, no longer a gas but a liquid, very persistent, which wounded rather than killed, and which rapidly reduced effective strength. Used experimentally against the English on the nights of 21-22, then of 24-26 July, 1917, yperite was used by the Germans on the Verdun front to counter our attack of 20 August and there produced considerable effect; the 300,000 projectiles fired in August and September caused more than 12000 evacuations, of which only 140 died in the hospitals. "We were outdistanced, and we were not to effectively reply by the use of a product of the same nature until April, 1918. The Germans' lead on us in this respect at one time was a source of real inquietude, for the effectives of units which were attacked suffered considerably and the struggle against yperite seemed most deceptive of solution (1)."

But, this increase in the material means was accompanied by a corresponding decrease in infantry effectives and of the role of infantry in battle; the artillery tending more and more to become the principal arm.

Be that as it may, the effect of this augmentation of material power was greatly to facilitate tactical surprise.

In fact, it was now possible to reduce the length of our artillery preparations:

--- by the availability of new rapid fire heavy artillery materiel (2);

--- by the use of toxic shell in mass;

--- by the use of tanks, which would even permit the elimination of all artillery preparation.

(1) Commandant Bouvard, Military Lessons of the War.

(2) It was not estimated, Instruction of 31 October, 1917, that the length of the artillery preparation could be reduced from six to three days or four days at the most, without losing any of its effectiveness.

The Germans, moreover, in their operations of 1917 against the Russians, as we have already noted, had shown the tendency to reduce the length of artillery preparation by the use of toxic shell, not only during the execution of the attack, but also during the preparation itself. For their counteroffensive in Galicia (19 July, 1917), the artillery preparation lasted seven hours, the first two hours of which were devoted to the neutralization of hostile artillery by gas shell; the same procedure was had at the attack on Riga (1 September, 1917), where the artillery preparation lasted only five hours and ten minutes. Surprise was otherwise prepared by concealing, as far as was possible, the preparations for attack of every nature (camouflage of such works as were indispensable, placing the means in position by night and at the last possible moment).

On the contrary, in spite of the fact that the French high command was perfectly aware of this new possibility of obtaining surprise, it showed itself not the less partisan of limited objective attacks at least for the initial stage of major offensive. It believed, in effect, that the opponent must be worn down, that his reserves must be absorbed, before the break-through could be considered although not new, this idea was very correct, (1) but its application is not without difficulties. We have already shown that the efforts to cause a greater wearing down of the enemy than the wearing down produced in our own troops presents a very delicate problem which is not always solved according to our expectations. And further, after a given number of actions of this kind, when shall we know that the time has come to attempt the break-through? To do this, we would have to be able to read the enemy's moves as in an open book, and to know that from a stated time his reserves had been exhausted. The deuxieme bureaux (2), in spite of their activity and their undeniable competence, will always have difficulty in arriving at such certitude. Finally, might not the favorable opportunity be presented before the enemy has used all his available means? It thus appears that the best system is that which permits the wearing down of the enemy, but, at the same time, permits taking advantage of favorable circumstances. The multiple attacks, provided for by the Instruction of 31 October, give the means of attaining this result, provided that they be not simultaneous and that their objectives be not limited a priori.

In every case, it had now become certain that if the attack could be sure of counting on surprise, the efficacy of the defense had become more and more doubtful. In fact, the offensive had succeeded in overcoming the difficulties which the adoption of all the resources of fortification and defensive tactics had opposed to it. Furthermore, the defensive measures which the Germans adopted betrayed on their part a real fear of a break-through, while we ourselves did not believe we could accomplish the break-through with any degree of rapidity. What we seemed to fear the most, and that with reason, was surprise, which is, in fact, the great enemy of the defensive, and which was becoming more and more difficult to guard against. Briefly, at the end of 1917, the struggle between the shell and armor again turned in favor of the shell.

In spite of the superiority which the attack had now attained, many minds remained dominated by the impressions of the battle of the Aisne, which we had been too hasty in considering as a reverse; the result of this was, says General Mangin, "a lessening of every energy", which destroyed all confidence in the success of major operations. The tragic events of the spring of 1918 were to be necessary to rekindle courage and again to extend every will towards the common objective; stop the invader.

The fact was that the major offensives which had been attempted on our front for the purpose of breaking in the fortified front of the enemy and obtaining a decision, had always ended in failure. The reason for this was, in

(1) The Decree of 28 May, 1895, on service of the armies in the field, called for a phase of preparation preceding the decisive attack, which might last several days and the purpose of which was to "wear down the enemy by serious and continuous losses, to constantly threaten him, to force him to engage his reserves, to immobilize him by partial attacks and to hold those which he might attempt, even though they be of a decisive character." The purpose of this preparatory battle was so well understood that it had commonly received the name of "battle of usure".

(2) Second sections, i.e., intelligence.

the first place, they were generally not provided with the means needed to crush organization which had such strength and which were so stubbornly defended; and, secondly, the methods employed were not adequate, either to the object in view or to the situation of the moment. Thus, our offensive battles always remained in the phase of the first act of the break-through, that is, the break-through always remained incompletely accomplished. Furthermore, in this year of 1917, as Russia had not furnished the assistance which had been counted upon, the Germans were able to decrease their effectives on that front; and although they could not send organized large units into France from that front, they at least were able to send there the youngest elements of the divisions which were left in Russia. Furthermore, exchange of division between the two fronts, allowed the divisions which had been ----- by our attacks to rest in Russia, without decreasing the divisions which remained in France. This explains why the task of the Franco-Britannic armies was much heavier than had been expected (1). These impressions, coinciding with the let down in energy, naturally led to the creation of doubt in the possibility of exploiting accomplished successes with sufficient speed to carry the war into the open.

We shall see that this deceiving mentality was not shared by the Germans.

(1) English losses for 1917: 800,000 men, of which 240,000 were killed or disappeared. French losses for 1917: 425,000 men, of which 143,000 were killed or disappeared (for France, the smallest losses of the five years of the war).

CHAPTER VI

THE YEAR 1918

THE BREAK THROUGH OF FORTIFIED POSITIONS AND THE RETURN TO OPEN WARFARE.

This last year of war is naturally divided into two distinct phases:

The first phase is marked by the great German spring offensives;

The second phase is made up of the victorious offensive of the Allies.

I. -- First Phase.

The first phase corresponds to the great German offensives of the Spring of 1918, which again produced open warfare on our front. In effect, on several occasions, the Germans had practiced, or themselves had been made the object of, a break through in the eastern theatre, and thus had had opportunity to fight in open terrain. They therefore, along with their leader, Ludendorff, firmly believed in the possibility of the break through and of the exploitation of success. Furthermore, from the end of 1917, they trained their troops in open warfare maneuver. Ludendorff wrote: "Every thought must be turned away from trench warfare and towards the offensive." Furthermore, in Germany, it was believed that a peace of compromise, in which there should be neither victor or conquered, was from then on impossible; and that only a victory of arms could end the conflict. The submarine war, decreed on 1 February, 1917, and which, in six months was to have produced decisive results, had not fulfilled its promise; and the rush of American forces into France now appeared to be inevitable. In addition, as we have seen, the means of the attack had become superior to the means of defense. Lastly, the armistice with Russia (20 December, 1917), had relieved the Germans of all solicitude in that direction. It was essential, then, before the American help should have reached its full effect, to force the principal enemy to lay down his arms. Ludendorff said: "The situation in our own country and in those of our Allies, and the condition in which the Army found itself, demanded an offensive which should produce a rapid decision. This was practicable only on the western front..... This required tremendous materiel and strong troops who, like their leaders, should have been trained for the offensive. If these conditions could be assembled in time, we could, we even were forced to attack..... I knew that an offensive in the west would be one of the most difficult operations in the history of the world." And he adds: "Attack raised the morale of the troops, defensive lowered it. The offensive was thus to the interest of the army. On the defensive the army was bound to succumb little by little to the constantly increasing superiority of the enemy in men and in materiel. The army itself had this feeling."

The Germans were thus to gather nearly all their forces against the Franco-British front: 203 divisions out of 241. The transport of troops began at the end of 1917; and 50 new divisions were brought up which were destined to give the Germans a superiority of about 30 divisions over the Allies during the first months of 1918.

Ludendorff hoped to secure the rupture of the front by one or several offensives, which were to be pushed to the limit and which were to have the maximum means available. However, the strength and depth of our defensive organization led him to believe that all parts of the front were not equally favorable for an offensive on a grand scale. Ludendorff who, "when dealing with the Russians, the Roumanians and the Italians had shown himself to be the passionate courtier of strategy; but, when faced by the French and the British, he abandoned strategy and became the slave of tactics. He no longer sought the sensitive spot of his opponent for the maximum strategical success; he was looking for weak spots where he might find the minimum tactical resistance (1)." Furthermore, Ludendorff himself has given us the reasons which dictated

(1) Colonel Becker, Trois Conférences sur Ludendorff, chef d'armée.

the choice of the zone of attack. "It is somewhere in the neighborhood of St. Quentin that the front is least strongly held..... From a tactical standpoint an attack against the center, was the most favorable; it would strike the weakest of the enemy's positions and the terrain presented no difficulties Pure strategy had to give way to tactics."

Let us then see what tactical methods he was to employ to produce rapid and deep penetration.

I. The German offensive doctrine. New attempt to reconcile method and rapidity. -- The procedures used by the Germans for their great offensives of 1918 were deduced from those which they had employed with success against the Russians in 1917; that is, they were characterized by:

Efforts to secure surprise during the preparatory stage. (1)

Rapidity and continuity during the execution.

1st. Attempts at surprise. -- Strategic surprise was sought on the one hand, by maneuver (on 21 March the indications of attack were the same in Champagne and in Picardy), and, on the other hand, by a concentration of the mass of reserves in a central area (Hirson, Maubeuge), the location of which would not disclose the real purpose of the concentration.

Tactical surprise was to be secured:

By a very careful camouflage of preparatory measures;

By very severe discipline of circulation;

By very close supervision of telephone conversations and of correspondence;

By secret distribution of orders, always written in longhand by an officer;

By limiting the movement of attack units into concentrations to night movements. (2);

By bringing them up at the last minute (with the exception of the artillery);

By the brevity and the violence of the artillery preparation, depending upon technical preparation of fire, on the neutralization of the opposing forces (infantry and artillery) by gas shell, and upon the destruction of obstacles by minenwerfer.

2d. Rapidity and continuity in the execution. -- Convinced that once the attack is launched, every respite permitted the enemy is a serious error, which must be avoided at all costs, the Germans sought and applied methods capable of accelerating and of sustaining the offensive thrust. "Rapid progression offers the maximum protection and secures success", said the Regulation of January, 1918 (attack in position warfare).

Consequently:

a. Once the infantry attack is launched, it must be conducted as rapidly as possible, and to the greatest possible distance, without any halts.

b. The enemy's artillery system, which forms the skeleton of the defense, must be dislocated at the first blow; to this end "the attack will ex-

(1) "In every offensive action it is of decisive importance to produce surprise". (Regulations, 1 January, 1918.)

(2) Some of the divisions which took part in the 21 March attack made as many as nine night marches.

tend to a depth of 8 kilometers or more, in advancing up to and beyond the hostile artillery positions" (Note of 25 January, 1918).

c. As the artillery can not move up at the same speed as the infantry, the attack will consist of two phases:

A first phase, or battle of position, during which the infantry will advance under the cover of the rolling barrage, its rate of advance being assured by selected troops or shock-troops (1); this is a general operation in which the initiative of the lower echelons is reduced to the minimum;

A second phase, or battle in the intermediate zone, which has its beginning beyond the limit of the rolling barrage, or whenever it has lost liaison with the infantry; the direction of the battle then is entirely incumbent upon the subaltern leaders, regimental and battalion commanders. As it can then no longer rely with certainty upon the support of artillery, the infantry must itself have available the necessary means in fire power to enable it, at least temporarily, to conduct the action alone.

d. In order to take advantage of favorable opportunities without delay, stubborn assaults are not to be made against strong points; but, on the contrary, as deep penetrations as possible are to be made into the zones of least resistance; whence such strong points or machine gun nests may be taken "by means of flanking action and action from the rear" (Note of 25 January). This is the encircling maneuver by infiltration; always the same, whether within fortified positions or in open terrain. It points out to the executant the point where he must apply his reserves in order most quickly to widen and deepen the breach which has been created.

e. Finally, to feed such an attack, not only must very numerous reserves be available, but they must be engaged only in case of necessity; that is to say, only when the front line units have played out.

3d. Employment of large units.-- Under these conditions, the break through battle was considered to be composed of a series of successive efforts having in view, first of all, an irruption into the hostile organizations, with objections as far distant as possible, in order to realize a total penetration of such organizations, and finally to pass to open warfare. "The initial break through is relatively easy; the attacker having liberty of action, it is possible, at least in the beginning of the attack, to assure the cooperation of the different arms by establishing the sequence of the battle beforehand down to the most minute details. It is impossible to avoid the restriction of the initiative of the subordinate echelons of command which results from this procedure. For the rest of the action, great latitude must be left to spontaneous collaboration." (Regulation of 1 January, 1918.)

In order to husband the large units in reserve to the greatest extent, the first line divisions were to be engaged upon narrow fronts (two infantry regiments in first line, one infantry regiment in support, reserve of the infantry division), and were to conduct the battle as long as possible. (2) "The idea that our attack divisions must be relieved after one day's fighting can not be entertained. On the contrary, by means of tactical skill, the infantry must conserve its combat value, in such a way that the divisions shall be able to wage offensive battles of several days' duration (3), and during the course of which a considerable advance shall have been made." (Note of 25 January). And again: "The infantry which is farthest in advance must continue its advance as long as it is possible for it to do so and must not be re-

(1) Stosstruppen.

(2) The Regulation of 1 January said: "It is preferable to have an infantry division attack until it is completely used up than to execute several successive attacks with divisions relieving each other."

(3) In the 21 March attacks the majority of the first line infantry divisions fought for two or three days, some of them for even eight consecutive days.

inforced from the rear unless it is absolutely necessary to do so." (Note of 8 February.)

The dominant preoccupation, therefore, was only to engage reserve units as late as possible, always with the purpose of conserving available troops to push still farther on. Also the role of the command upon the battlefield was defined as follows:

a. Economize the infantry.

b. Engage the reserves only at a favorable time and at points where progression has become marked. "Premature engagement of the reserves invariably uses up the attack and leads to the stopping of the offensive movement before it has been possible to effect the penetration." (Note of 25 January.)

c. Always maintain the echelonment in depth of the attack formation in order to cover the flanks and to confront counterattacks. "If echelonment in depth is constantly maintained, it is almost certain that counterattacks will be repulsed." (Regulation of 1 January.)

d. Constantly reconstitute reserves during the course of the battle in order to insure continuity of effort. "As soon as a counterattack or a hostile attack has been repulsed, push forward immediately and pursue. The principal care of the command must be to see that the forward movement is immediately renewed and that the enemy is always pressed as closely as possible... Constitute new reserves by gathering up every available unit; again get them closely in hand." (Regulation of 1 January.)

e. Lastly, constantly insure liaison and follow the battle from close at hand. "The position of the commander is of great importance. All staffs should be on the battlefield, those of the divisions being located well to the front." (Note of 25 January.)

4th. Employment of the different arms. -- Infantry. -- In order to fulfill the role assigned to it in the battle, the infantry no longer will have only to occupy ground, but must conduct battle with its own means to break the resistance which it will meet. Furthermore, those means had been augmented in order to permit the infantry temporarily to dispense with the collaboration of the artillery. In addition to its rifles and heavy and light machine guns, the Regulation of 1 January, 1918, provided "that, in attacks of great depth, batteries of horse drawn artillery and minenwerfers should be placed under the orders of infantry regiments"; and the Annex of 26 January fixed their number; "in general, one field battery of the division artillery regiment and 6 light minenwerfers per infantry regiment."

Furthermore, even in the first phase, in spite of artillery support, the infantry might have to fight. In fact, the Note of 8 February stated: "The resistance must be constantly repeated that it is a fact that a barrage will never form a thick curtain of fire, and that it will never relieve the infantry from its necessity to wage battle at close distance with its machine guns, its rifles, bayonets, grenades and light trench mortars as well as with its accompanying artillery. But barrage fire will aid it in such fighting..... at present, too little importance is attached to the support which the infantry should find in the fire of its own arms, in the way we were accustomed to do in peace-time maneuvers with our system of advancing by bounds. The infantry must not only be assisted in its advance by artillery firing from positions well to the rear, by the fire of accompanying batteries and light trench mortars, but it must help itself principally by its own machine gun and musketry fires." (1)

(1) The instructions of Ludendorff constantly dwell upon the necessity for using the heavy machine guns in the offensive during the preparatory period as well as during the period of execution.

In the second phase the attack can not be prescribed in a precise manner, no longer does it unfold like an automatic machine: "Once the hostile positions and artillery positions have been carried, the battle takes on the character of war of movement. Methodical preparation ceases; the genius of personal decision and of vigorous intervention take the ascendant..... Pursuit of the enemy, rapid and uninterrupted; allow him no respite, even at night. No waiting for neighboring units; however, there must be constant readiness to protect the advance by fire against unforeseen resistance..... If the enemy has been able to stick to a position, carry it at a single rush while keeping up constant pressure, which, however, should be supported by fires; very often a short concentration of machine gun, minenwerfer or accompanying artillery fires will be sufficient. In most cases, postponement of taking such positions will require still greater sacrifices..... Finally, if the enemy has had the time to man positions to the rear with fresh reserves, first clear him from the zone in front of such positions, then conduct reconnaissance. The attack will then be ordered by the superior command, with the coordinated employment of all the means. It will be preceded by an artillery preparation. Proceed here as above, but with some more speed than in the case of the first attack." (Regulation of 1 January.)

It is then that "the decisive role played by the commander of all ranks and upon all arms makes itself felt. An attack does not develop automatically; the command must fulfill its function which is to command; every one must display initiative." (Note of 8 February.)

"In the break-through, as well as in warfare of movement, secondary commanders starting with company or battalion commanders, from the movement the barrage starts must be free to act and to make use of their tactical skill. The decision will often depend upon the actions of commanders of secondary units." (Note of 25 January.)

Exploitation of success is thus based on the rapidity of action of the infantry and on the initiative of the subordinate officers and non-commissioned officers; and, consequently, upon the decentralization of command.

Artillery. -- The brevity and the violence of the artillery preparation, which should insure surprise, will be obtained as a result of technical preparation of fire which permits the almost complete suppression of adjustments, and particularly as a result of the principle of the neutralization of the means of the defense by gas shell which has taken the place of the old principle of destruction which has become impossible of accomplishment. This neutralization is to be effected, not only during the execution of the attack, but also, and particularly, during the artillery preparation; as this effect (as opposed to the effect of destruction) can be only temporary, it is essential that the infantry attack be conducted "rapidly and decisively". Massive fires of gas shell are to be used not only upon hostile batteries, but also upon the organs of defense (infantry, machine guns, minenwerfer), and even upon the rear areas. (1)

Systematic fires for destruction are to remain normal before the battle begins and become exceptional only on the day of the attack. In the Note of 8 February, Ludendorff even calls attention to the fact that "counterbattery work, assisted by meticulous observation, should increase in intensity on all fronts before the attack begins." (2)

(1) "The total destruction of the occupants is generally an impossible task for the artillery. It is for this reason that the moral effect upon the occupants is of much or even of greater importance than the action of destruction." (Artillery battle regulations, 1917.) Fires on sensitive points of organizations in rear are "very important on account of the decided disturbance which they may occasion in the general direction of the battle". (Regulation of 1 January.)

(2) On August 1, Ludendorff again published its importance, which he had noted at his own expense: "In one month", he wrote, "the fire of the enemy has completely destroyed, in round numbers, 15% of the pieces engaged in the battle. This figure clearly demonstrates the value of an alert counterbattery."

As regards the minenwerfers, whose range had now been increased to 2000 meters, they will be charged, during the preparation, with the destruction of the wire and the essential organs of the defense, which will free a notable amount of artillery for the execution of other missions.

As to the length of such preparation, the Regulation of January 1 said: "The requirement that, at the moment of the assault, the artillery be paralyzed and the essential parts of the defensive organization be destroyed can be accomplished only by an artillery **preparation** of several hours..... Recourse must not be had to a rolling fire of several days." And the Note of 8 February adds: "Efforts to obtain an effect of surprise must not lead us to be satisfied with hasty preparations. They must not result in an excessive **diminution** of the artillery preparation..... The fact must not be lost sight of that a bombardment of one hour is not sufficient to obtain a satisfactory destructive effect. The most difficult is to get sufficient destruction of rear positions (principally wire)." The Note of 16 February estimates the length of fires on the hostile artillery to be two hours, and upon the infantry positions as the same figure. In the beginning all the artillery is to be concentrated upon that of the enemy; this fire is generally to begin at night so as not to hold the infantry in its jump-off positions too long.

In the first phase, the rolling barrage "shall be executed with the greatest possible number of batteries", its advance **being** regulated "so that the movements of the **assaulting infantry** shall proceed without halts". Thus, batteries of all calibers are to take part in the barrage, which will be a double barrage, the curved fire of mortars and of heavy pieces being placed in advance of that of the light artillery. The minenwerfers will participate within the limit of their range. As to the density of the barrage, Ludendorff wrote in his Note of 16 February: "I am convinced that a rolling barrage, using any kind of ammunition, and having a width of from 70 to 80 meters per battery (of 4 pieces) of light artillery, will give good results". The use of smoke shell, when the wind may be favorable, and blue cross shell (sternators) was provided for.

In regard to the rate of advance of the barrage, the Annex of 26 January considered two cases: "either it displaces forward according to schedule, or an attempt may be made to keep its progression in hand by means of optical signals". Ludendorff favored the second method: "In fact, the infantry must not be tied down to the rolling barrage, otherwise the dash of its attack may be broken behind that rigid curtain of fire." The barrage, then, will progress according to a previously determined time table, except for modifications in its progress of which the artillery will be notified while the barrage is being fired; this information will be given to the artillery by means of luminous signals which are to be "simple and of limited number". But he does not ignore the difficulties involved: "Everything depends upon observation, upon the rapid transmission of signals and orders, and rarely will it be possible to place entire dependence on those means. (1)

In the second phase, the Regulation of 1 January said, "The infantry must not at any time be deprived of a powerful artillery support. And the artillery combat regulations of 1917 added: "This mission is most important and the most difficult for the artillery during the break through. The artillery which has taken part in the preparation of the initial break through can only be partially charged with this mission. An additional powerful and mobile force of artillery must be available." In fact, the artillery was to be divided into three components:

The infantry accompanying artillery, which advances with it;

The batteries designated to displace forward and to be part of the advancing mass of attack (2);

(1) Nevertheless, it was observed that when the infantry did not succeed in an attack, it fell back, sent up a rocket, and that the bombardment was immediately brought down again on the position to be taken.

(2) On 21 March, the artillery was to begin its displacement one half hour after the attack was launched; in the later offensives, it displaced at periods varying between one and one half and three hours after H hour.

The batteries remaining in position, the most advanced of which should cover the forward displacement of those above.

Lastly, the organization of command within the artillery underwent radical changes, which had been tried out for the first time in the attack on Riga (1 September, 1917). While the artillery struggle had always been considered as a mission for which the division artillery, reinforced for this purpose, was responsible, it now was confided to a particular commander who was generally to be the commander of the corps artillery, and who had the bulk of the heavy rifle batteries under his orders. It is thus seen that as far as counterbattery is concerned, the Germans by degrees had been led to completely adopt our method.....

Aviation. -- The German aviation, being **decidedly** inferior to that of the Allies, was to attempt to gain the mastery of the air only during the actual time of the attack in order to insure the functioning of the planes working directly with and for the infantry and the low-flying planes with liaison missions and taking part in the battle by machine gunning the hostile infantry. For this purpose, strong patrols (5 to 20 planes) were to map up the air and force the disappearance of the hostile planes, provided they were not out in force.

Long distance reconnaissances were to be executed by single planes flying at great altitude. On the contrary, night bombardment missions were to be confided to complete squadrons.

It is to be noted that none of Ludendorff's Regulations or Instructions made any mention of the cavalry as an arm for exploitation of success after the rupture of the front.

It will be seen that this is an entirely different conception from that of the system of limited objective attacks laid down by the Instruction of 31 October, 1917, from which the German doctrine differed upon the following points:

a. More complete efforts to secure surprise (the first requisite of success) by the employment of every method capable of assuring the secrecy of preparations and to reduce the length of the artillery preparation (particularly by the neutralization of the means of defense rather than by their destruction).

b. Exploitation to the greatest possible extent of the effect of surprise by rapidity and continuity of execution (the second requisite of success), which were to be produced by:

-- reinforcing the fire power of the infantry, so that it could continue the action, at least temporarily, without the collaboration of the artillery;

-- requiring the artillery always to be able, at least partially, to support the infantry at all times during its advance.

Such were the methods which Ludendorff adopted in order to reconcile the necessity of method and of rapidity, the most delicate problem; and the solution of which he sought by freeing the infantry from the tutelage of the artillery. From this fact, the infantry regained the preponderant role in battle, of which position warfare had tended to rob it.

II. Application to the German major offensives of the Spring of 1918. -- The German offensive in Picardie of 21 March was unquestionably the most vast operation which had been attempted since the beginning of the war. It was engaged on a front of about 70 kilometers, between the Scarpe and the Oise, and was conducted with 73 infantry divisions, of which 15 were in sector and 42 in the first line. 50 infantry divisions had been concentrated upon this front in seven days by night marches. The artillery preparation lasted five hours, two hours of which were upon the hostile batteries. It was executed by a powerful artillery force (on an average of 12 light batteries and 11 heavy batteries per kilometer) which had a density of one piece per 10 meters of front.

The attack was directed solely against the English front to include its point of juncture with the French armies. It was here that the V British Army (Gough) was attacked by forces of three times its own strength, on a front of 20 kilometers, and at which point the break through was effected. Beginning with the 24th the first available French divisions began hastily to arrive to fill the breach and to reestablish liaison with the English right. If at this moment, a mass of hostile cavalry had been pushed into the open terrain, the battle would probably have developed entirely differently. On the contrary, under the influence of our resistance which continued to increase, the enemy's advance became slighter and slighter; beginning with 30 March, the battle came to a lull; and when it was resumed, on 4 April, south of Montdidier, it was too late; a new front had closed in rear of that pocket which was 50 kilometers deep.

Then Ludendorff suspended the Picardie offensive and on 9 April launched the Flanders offensive, first between the La Bassée Canal and Armentières (a 15 kilometer front), then Ypres, with 9 infantry divisions in front line, then five new divisions (two hours artillery preparation). Here again, after marked success, which seemed to open the road to Calais, the Germans were stopped by the stubborn resistance of the French at Mont Kemmel (25 April). The pocket which was formed had a depth of about 12 kilometers.

It may well be asked how, with such means, the Germans did not succeed right from the start, in crushing the forces which opposed them, and which, until the early days of April, were certainly less than half the forces which the Germans had on the front of attack.

One of the most important reasons was the lack of reserves, in spite of considerable numerical superiority.

In order to feed the 21 March attack, they had to use 73 of the available infantry divisions in the first six days, then to engage 10 new divisions in the following four days and 9 others between the 1 and 8 April. Total: 92 infantry divisions. Immediately following the Flanders attack required 38 more infantry divisions. The forces which were engaged during the first month of the offensive thus reached the figure of 130 infantry divisions, 31 of which attacked twice, that is, 161 division engagements. As the number of German infantry divisions upon the western front did not exceed the maximum figure of 207, it is seen that two-thirds of his forces had taken part in the first offensive; and nevertheless his opponent was still in condition to face him. Thus, the final check of the offensives of 21 March and 9 April must be attributed to the exhaustion of reserves much more than to all other causes. Under these circumstances it is not an exaggeration to say that to execute a break through and fully to exploit it, very heavy reserves must be available; furthermore, they are essential because of the progressive extension of the initial front of attack as the salient begins to grow within the enemy's line, up to the time when the front becomes definitely broken. (1)

Another reason of ultimate failure must be sought in the lack of rapidity in the advance, which allowed us in every instance to bring up to the threatened locality the forces necessary to parry the danger. If we consider the advance on the principal axis of attack: Saint Quentin--Montdidier (21 March offensive) the rate of advance was as follows:

21 March, advance expected: 9 kilometers.

Actual advance: 5 kilometers; fighting in the interior of organized positions;

22 March, advance expected: 12 kilometers.

Actual advance: 5 kilometers; fighting in the interior of organized positions;

(1) The number of infantry divisions in front line on the front of attack increased from 42 on 21 March to about 70 in the early days of April.

23 March, advance expected: 20 kilometers.

Actual advance: 16 kilometers; open terrain available;

24 March, actual advance: 6 kilometers; contact with the first French infantry divisions;

25 March, actual advance: 10 kilometers;

26 March, actual advance: 8 kilometers;

27 March, actual advance: 6 kilometers;

28 March, actual advance: 4 kilometers; beginning of serious French resistance;

29 March, actual advance: 1 kilometer;

30 March, actual advance: 3 kilometers.

As a matter of fact, as soon as the German infantry was deprived of the rolling barrage, it advanced only with the most extreme prudence and allowed itself to be too easily halted by the least resistance, particularly by machine gun nests. Ludendorff did not immediately take this situation into account, and, in a series of Notes (1), he further defined certain points of the doctrine.

He first noted that, more than ever, success depends upon rapidity and energy in execution; upon the initiative of the infantryman in the fights which he must deliver beyond the first lines.

He again specified that the battle is made up of two distinct phases: the methodical attack against the organized positions, which requires a minute preparation and is arranged by the High Command; then "the continuation of the attack against an opponent who is not yet installed on a continuous front, in which long drawn out preparations must be abandoned, so as not to allow the enemy time to collect himself. Success then depends far less upon the intervention of the High Command than upon the ability and the spirit of resolution of subordinate leaders, who must advance the attack by means of rapid action." (Note of 17 April.)

He finally urged that the infantry be taught how to take machine gun nests (2) by making use of all the means of fire power with which they have been provided. The battery of artillery attached to each infantry regiment after being too late in rendering support to the leading battalions, Ludendorff provided for the eventual assignment of one group of light artillery and even a detachment of heavy artillery. In this manner, each leading battalion would have available a section of artillery, which would not prevent the regimental commander, in case of local resistance, from making his action felt. Thus the battle in the intermediate zone, which is made up of isolated

(1) Notes of 30 March, 1 and 17 April, 13 and 15 May, 1918.

(2) "During our offensive, the principal resistance came from machine gun nests distributed in depth. The total destruction of these nests of machine guns by the artillery bombardment preceding the assault, even when it has been of considerable duration, was not accomplished; and it cannot be considered that such destruction is possible. We must be satisfied to neutralize these nests to the greatest possible number by fires of heavy artillery and a bombardment of blue-cross gas shell." (Note of 30 March.)

combats (1), lead to the creation of the mixed battalion, for the sole purpose of facilitating the advance of the infantry, to quicken its movement and to accomplish the break-through within the minimum of time.

Ludendorff further indicated the fire tactics to be employed to reduce machine gun nests, instead of attempting to take them with the bayonet, and he adds: "It is ordered that the necessary measures be taken, as soon as possible, to acquaint all units with this method. The idea that success is won by blows of masses of troops must be absolutely destroyed. Such methods result only in useless losses. It is not numbers, but fire power, which is decisive. (2)"

As a result of the 21 March and 9 April offensives, two salients had been created which the Germans were to attempt to exploit in order to join them up. The English Army, they thought, had been bled white. In fact it had lost 300,000 men; 53 of its divisions out of 60 had been engaged, of which 25 had been reduced to the condition of skeletonized units. On its side, the French Army had had to throw half of its divisions into the battle; it had extended its front of 125 kilometers, which made its situation more difficult. Finally, the morale of the people of the Entente had been decidedly shaken.

On the other hand, common danger had forced the Allies to take the first step towards unity of command. On 26 March, at the Doullens conference, General Foch was charged with the coordination of the action of the Allied armies upon our front. From then on the defensive battle was to be conducted according to the following very simple ideas:

-- not to give up another inch of terrain;

-- at all costs, to maintain close liaison with the English;

-- constitute reserves (on 7 April, they already amounted to 12 infantry divisions);

-- make preparations for a counteroffensive. Finally, on 14 April, General Foch received effective command of the Allied armies. At all events, these first offensives had very effectively used up the German Army; losses were heavy and, even this early, the divisions could not be completely reconstituted; a delay was imperative before making a new attempt, in order to rest and reequip their divisions; this was to require a delay of a month, which the Allies, particularly the English, were to take advantage of for reorganization.

2d. General Foch was already making preparations for a counteroffensive to disengage the Amiens--Paris railroad, when he was forestalled by the German attack of 27 May on the Aisne. True to his principles, Ludendorff had chosen the Chemin des Dames front, weakly held by used up divisions, upon which to launch his new effort. Instead of again attacking the English Army in an attempt to put it out of action, he elected, as a preliminary, to draw the French reserves towards the south and to exhaust them. In fact, at this time, the mass of the French Armies was concentrated in the north, where there was

(1) "The necessity for the temporary assignment of artillery units to infantry regiments has become apparent, because the general attack, after breaking into a position which is methodically defended, develops into isolated fights, conducted by the infantry regiment of the line which has advanced. It is the province of the infantry regimental commanders, within the division and pursuant to the division commander's instructions, to direct this isolated battle. For this purpose he must have artillery support, and immediate control over the artillery units which are charged with that mission, who, consequently, must be placed under his orders (and as far as possible, always the same units.)" (Note of 15 May.)

(2) Finally, another cause of the German failure, which is not within the scope of this study, lies in the value of the defending troops; brave troops, energetically commanded, who, when they were not completely submerged by the attacking horde, exhibited unshakeable tenacity (Byng's III Army about Arras, French units south of Montdidier).

numerous indications of a new offensive. (1) On the 60 kilometers, the front of attack, there were only seven infantry divisions in first line and four infantry divisions in second line. (2) However, less confidence there was of a break through than on 21 March; the enemy had assigned objectives to be reached, marked by the general line: Rheims--heights south of the Vesle-Soissons. Immediately after that offensive, another was to be launched north of the Aisne, in the direction of Compiègne.

The concentration, began on 19 May, and put thirty infantry divisions into movements, again by night marches (except for 6 infantry divisions which were moved by rail). Finally, in order to make more certain of procuring surprise, the artillery preparation was to last only two hours and forty minutes and was to be conducted only at night (from 1 to 3:40 AM). This resulted in the deployment of a mass of artillery of about 4000 pieces, that is, in the densest section, one piece per 7 meters of front. The mass of attack consisted of 42 infantry divisions, 20 of which were in first line; furthermore, the defender, assailed by forces five times superior, was literally submerged.

On the evening of the 27th, the attack, which had advanced from 15 to 25 kilometers, reached the Vesle, and on the following day it halted on the heights south of the river which constituted its objective. Confronted with this un hoped for success, the High Command ordered the advance to be pushed towards the southwest and towards the south to reach the Marne. If at that moment (like the 24 March) a mass of cavalry had been thrown into the open breach, it would have been able to produce incalculable results. The movement was resumed on the morning of the 29th and the Marne was reached on the 30th. But on the flanks, the results were less brilliant: Soissons had with difficulty been taken on the 29th, while Rheims resisted every assault. Thus the pocket of Château-Thierry was formed, which in spite of every effort to do so, could not be widened. (3) On 4 June, the 42 infantry divisions had been used up; there was nothing left to exploit this advance of 50 kilometers. The Aisne offensive could be considered as having ended.

The Allied High Command had had to engage in the battle all of the cavalry divisions and 30 French infantry divisions, not counting 2 American infantry divisions and 1 British infantry division; the situation was critical, the reserves being nearly exhausted.

However, Ludendorff was to launch the offensive on the right bank of the Oise which had been planned; but time was needed to bring up the major part of the artillery which had already been employed the 27 May on the Aisne; also the date of the attack, originally set for the 7th, was postponed until 9 June. Furthermore, the preparations this time had not escaped the vigilance of the French; surprise was not to be realized and the losses were to be heavy. The artillery preparation, still a night operation, lasted four hours and twenty minutes (from 12 o'clock, midnight, until 4:20 AM) and was delivered by a mass of artillery as powerful as on 27 May. (4) The infantry attack, delivered by 19 infantry divisions, of which 13 were in the front line, was delivered over a front of 35 kilometers on the right bank of the Oise. The French held this

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- (1) Of 103 French infantry divisions, 65 were on the front, 26 (40%) of which were north of the Oise; of the 38 infantry divisions in reserve, 12 (1/3) were behind the English.
 - (2) The seven infantry divisions in first line were thus deployed on enormous fronts, varying from 6 to 12 kilometers.
 - (3) The number of infantry divisions in first line increased from 18 on the base of departure to 34 required to garrison the pocket in the early days of June.
 - (4) The greater part of the German batteries was put in place during the last two nights and was pushed well forward in a zone within 1000 meters of the departure trenches.

ground with a little more than 7 infantry divisions in the first line and 4 in second line. On the first day the attack made a bound of 8 kilometers in the center, while the advance on the wings was very slow; on the 10th, it again made some slight progress, but on the 11th an improvised counterattack was launched against its right flank, a counterattack which had been improvised in 24 hours with four infantry divisions (the last fresh troops which we had remaining) supported by 163 medium tanks. The surprise was complete, and the Germans offensive, after some unfruitful attempts, stopped on the 15th. To the 19 hostile infantry divisions, the French had opposed hardly 15, which were enough to hem in the attack, but this time their reserves were exhausted. If the Germans had been able to launch shortly after 15 June the major offensive which they launched only a month later, "no one could say what the result might have been" (General Buat).

The German offensive method, perfectly applied on 27 May and which was moreover favored by circumstances, had given complete satisfaction. However, Ludendorff felt it necessary in a new Note of 9 June, to again call attention to its principles, particularly that of audacity and energy to be exhibited by the infantry: "In general, too much boldness is less prejudicial than an excess of caution. Nothing but energetic vim, which no consideration can block, can produce large results. To this effect, neither most objectives be assigned which are too narrowly limited, nor must there be any anxious glances cast toward neighboring units. It is the business of the commander from the rear to look out for the security of the flanks..... As soon as the initial hole is made in the front, the infantry regiments must advance while fighting independently. For this purpose, aside from their accompanying artillery, they have light artillery and even additional heavy artillery at their direct disposition.....(1) The dash of the infantry, its marching ability, its endurance and its spirit of sacrifice, particularly in the case of its officers, are always the primordial requisites of great successes. The energetic vim of a single battalion or company commander can force the enemy to give way over broad fronts or to continue his withdrawal. (2)"

Nevertheless, Ludendorff, apparently alarmed at the reduction in effectives, insisted upon the necessity for further sparing the infantry: "If the infantry attack is conducted with the low density which is appropriate to an attack supported by machine guns, with the support of accompanying artillery, etc..... it will always have sufficient offensive power. A greater density than this serves only to increase the losses. The most vigorous resistance is broken much more readily by reinforcing the artillery than by adding to the infantry..... The new tactical instruction of our infantry (fewer lines of skirmishers and mass attacks, more attacks of machine gun in groups supported by masketry fire, by light and heavy machine guns, grenade throwers, bomb throwers and accompanying guns) gives our infantry a definite superiority over the enemy. It has given us success and has spared us losses." On the other hand, "the fundamental principle: engage your reserves at the point where progress is succeeding, should be given more serious consideration."

Finally, he left it be understood that it was no longer so much a question of producing the break through as it was of inflicting heavy losses upon the enemy;

The attack accomplishes its purpose when it inflicts upon the adversary losses which are markedly heavier than those which we ourselves suffer..... For us the question of gaining terrain at any cost scarcely ever is considered. We must beat the enemy while conserving ourselves. We have always a tendency, in the days following an offensive, to attack with mediocre means and to fight to gain terrain, which is of no importance in connection with the general situation.

(1) At this time, each machine gun company consisted of 12 pieces, each regiment was provided with 72 light machine guns and 12 light minenwerfers; but it had been impossible to make up the shortage in men, which had been caused by the preceding offensives (80 effective (combatants) per company, instead of 120 as on 21 March).

(2) And Ludendorff added in his Note of 13 June: "The guarantee of success lies only in the ability of the command and upon the offensive spirit of the infantry."

As regards the artillery, the Notes of 13 and 16 June insisted upon the following points:

A crushing artillery superiority must be sought as early as possible by its combined action.

More artillery must not be pushed forward than that which can be supplied. In principle, the infantry divisions in first line will at first push forward only their organic artillery. The rest of the artillery will form the commander's reserve, some batteries of which, at the disposition of the corps, will be used to gradually reinforce the division artillery. (1)

3d. It was only towards the middle of July that the German Army was again ready for the attack; out of its 207 infantry divisions, 81 were in reserve, but half of these were incompletely reconstituted. However, in the meantime, on 21 June, the Chancellor, von Kuhlmann, had declared that "the war could no longer be decided upon the battle field"; it was then that Ludendorff, still hesitant, but touched to the quick by that sensational declaration, decided to play his last trump. As he had not been able to widen the pocket of Chateau-Thierry towards the west, it was to be extended towards the west by a grand offensive in the Rheims area, in the direction of Chalons and Epornay, on a total front of 90 kilometers. If that attack succeeded, a new effort was to be attempted in Flanders. But, from 1 July, the French expected this attack and had made their dispositions to parry it. To the east of Rheims, in Champagne, the front having been fortified for a long period, a zone of outposts was to be organized (IVth Army); to the west of Rheims, as the organizations were without depth, the defense was to be made in place (Vth and VIth Armies); 70 infantry divisions were waiting for the attack, one-third of which (27 divisions) constituted the mass intended to execute, at the proper instant, a vigorous counteroffensive.

On 15 July, at 4:15 AM, after a preparation of three hours and twenty minutes the Champagne attack, delivered by 63 infantry divisions, was launched. On the front of our IVth Army (42 kilometers) alone, 50 infantry divisions, 26 of which were in the front line, surged to the assault of positions which were held by only 13 infantry divisions, 8 of which were in first line, the other 5 which were supported, it is true, by a very powerful force of artillery. (2)

The outpost position was taken after numerous local fights which disassociated the infantry, but the intermediate position, closed in on between 7 and 8 o'clock, could not be broken into in spite of seven consecutive assaults. At noon the attack stopped, it had completely broken down.

On the Marne front, the operation was opened with the crossing of the river on a front of 22 kilometers, with 13 infantry divisions, 8 of which were in first line. During the artillery preparation, between 1:10 AM and 4:50 AM (three hours and forty minutes) the passage of the Marne and launching of bridges (3 o'clock) was begun so as to allow the infantry to gain its departure positions which were located slightly south of the river. The attack debouched from these positions at 4:50 AM, but made progress only in the center and with great difficulty against the 9 infantry divisions of our VIth Army, 5 and a half of which were in first line. By the night of the 15th, the advance had made only 5 kilometers on a front of 15 kilometers and the artillery had not been able to cross the bridges which were constantly bombarded by our guns and our aviation.

However, between Rheims and the Marne, on the front of our Vth Army, the advance had been more pronounced; it reached about 10 kilometers and was beginning to force the Montagne de Reims in the direction of Epornay; but on

(1) In fact, as the artillery can only be pushed forward progressively, the heavy calibers necessarily remain back; thus after the advances of 21 March and 27 May, the 21 cm. mortars were observed in action only after two or three days of stabilization.

(2) 1500 - 75s and 1200 heavy pieces; that is, one piece per 17 meters of front.

the 16th and 17th, the enemy was held on that part of the front, while the situation of the divisions which had crossed the Marne were becoming more and more critical.

This was the moment which General Foch chose to launch his counteroffensive of 18 July against the opponents right flank, between the Sisno and Belloy, on a front of 40 kilometers. The Xth Army (Mangin), to the north, had 18 infantry divisions, 470 batteries, 244 medium tanks and 225 light tanks; the VIth Army (Degoutte), to the south, had 9 infantry divisions, 230 batteries, 48 medium tanks and 225 light tanks. The Xth Army debouched at 4:35 AM, without any artillery preparation, and the VIth Army after a preparation of one and one-half hours. The Germans, who, after 15 July, no longer expected a counteroffensive, were completely surprised and were pushed back 8 kilometers on a front of 20 kilometers. For five days Ludendorff was to battle in order to reestablish the situation, but without success, particularly since the Vth Army (Bortholot) began to menace the other flank of the salient. He gave the order to recross the Marne on the night 19-20, then to evacuate the salient as far as the Vesle. At the same time he was forced to abandon the Flanders attack. The initiative of operations had passed into the hands of the Allies, never to leave them again.

The lesson had been a severe one; Ludendorff sought to draw conclusions from it for future use, for he had not given up the idea of the offensive, which alone could save Germany. In his Note of 22 July, he noted that the "attack procedure, in cases where the enemy did not fall back promptly, was good". But, if the enemy **received** the attack with his infantry and artillery greatly echeloned in depth, and evacuated a zone several kilometers deep, there must be greater flexibility in the execution of the attack, in order that it might adapt itself to the attitude of the adversary; "establishing beforehand all the details covering several hours of the execution quickly leads to the break-down of the system..... It is at that time that the subordinate commander, below the division, must take action on its own account".

Improvement of offensive methods was therefore, to be made in the following particulars:

2) a. "The duration of counterbattery fire preceding the engagement of the infantry should be reduced in proportion as the targets might be less numerous. We must not allow ourselves to be **deceived** by dummy batteries and revolving guns; it is useless to take nonexistent batteries under persistent fire, as was done on 15 July. On the other hand, counterbattery fire after the infantry has become engaged, must be kept up and must be reinforced." For that purpose, certain batteries will be pushed well to the front, will be kept in communication with every possible means of observation, and subaltern artillery commanders will, upon their own responsibility, conduct counterbattery within their zones of fire. "We may hope that, to a depth of from 7 to 10 kilometers, the hostile artillery thus held under fire by relatively weak forces, will be neutralized to such an extent that it will, at least, be unable to oppose any decisive obstacle to the progress of the infantry, and particularly to the advance of the accompanying arms.

b. In the struggle of the artillery against infantry, "a long prolonged bombardment of weakly defended positions in the advanced zone is useless..... It is only a question of effecting relatively slight and partial destruction; but, on the other hand, of paralyzing the adversary and of utilizing this result by immediate action on the part of the infantry".

To this end, it will be appropriate:

-- to reduce the artillery preparation which precedes the rolling barrage and which is directed in general against the first lines and weakly held zones; the action of minenwerfers is sufficient for this purpose;

-- on the contrary, to prolong the bombardment against lines and rear zones which are strongly held, this bombardment should immediately precede the infantry attack;

-- finally, to advance the barrage at a less regular rate and to make it conform to better advantage to the terrain and to the lines of resistance, upon which it should execute an effective preparation. In order to do this "the rolling barrage must be subordinated to the infantry, at least in part," and, not to ignore the difficulty of this system, Ludendorff adds: "Though this means may give success only in particular cases, it is worth trying. The possibility of holding the rolling barrage stationary or of accelerating its advance by means of signals or orders must, therefore, in no case be denied in principle, on the contrary, as a general rule, such procedure must be arranged for, in addition to the usual time-table progress of the barrage Furthermore, beyond from 3 to 4 kilometers, a rolling barrage which is governed solely by a time schedule usually either runs away from its infantry or holds it up. (1)" Beyond these distances, the barrage must be made effective by batteries which are pushed well to the front early in the action.

Nevertheless, "in spite of the improvement of artillery attack methods, success in battle will always, and not more than ever, depend upon the infantry..... The foot-soldier should know that after he has reduced the first hostile lines, he will find himself in a zone of several kilometers depth faced by stiff fighting, the success of which depends upon effective use of his own weapons, upon good liaison with the artillery, and upon the rapidity of his own personal action. Aside from this, there is no question as to the proper method for the infantry attack. Its basis is the combativeness and the daring of officers and of noncommissioned officers and the individual initiative of the private soldier himself. In the future it shall be the principal duty of every leader to excite and to cultivate these qualities, to inculcate discipline, self-confidence, individual activity, flexibility in battle, and to maintain intact the moral value of the infantry."

III. Conclusion. -- Thus, in spite of their methods, which had been brought to a high degree of perfection, the Germans were not able to crush the Franco-British front. Among the many reasons for their check, we shall recall only the following:

a. Their successive offensives, enveloped with the most profound secrecy, followed each other at an interval of time which was too long (about one month) to prevent us from reconstituting our reserves. The cause of this delay must be sought in the obligation which they were under to employ the same artillery materiel in all these attacks so that this artillery materiel had to be transported each time from one zone to another; also to the fact that they were forced to wait until the attack units should be reorganized. If the order had not been given that the first line infantry divisions remain engaged until they had exhausted their offensive capacity, perhaps it would have required less time to reconstitute them;

b. Rapidity of execution, so much urged by Ludendorff, was still insufficient; this was because the German infantry lost faith in success in direct proportion as the offensive followed one another. Discipline wavered along with confidence, and constantly increasing allotments of accompanying weapons could not make up for the decrease in the moral value of the troops;

c. The reserves, as we have shown in connection with the 21 March offensive, were perhaps not in sufficient quantity. The German superiority of from 30 to 35 infantry divisions over the Allies, that is, about one-fifth, was not great enough to feed the multiple offensives, and particularly to exploit their results. (2)

(1) On 15 July, the rolling barrage was regulated on a time schedule over a depth of 9 kilometers.

(2) The report on our offensive of 25 September, 1915, concluded that an offensive had better not be attempted, unless the troops available for a general offensive are not superior to the forces of the defense in the proportion of three to one (at the selected point, naturally).

Furthermore, it does not appear that these reserves were used in a very judicious manner. While Ludendorff on 21 March threw everything that he could into the balance, as if he must succeed in the first effort; he stopped his 9 June offensive while the Crown Prince of Bavaria still had more than 40 infantry divisions in reserve.

However, those reserves were very quickly used up; of the 78 fresh infantry divisions which the Germans had at their disposal on 21 March, they had remaining only 62 on 27 May, 43 on 15 July, and, one month after this, only 21. Furthermore, starting with the month of July, the situation was reversed, in favor of the Allies.

Finally, the engagement of the reserves itself left much to be desired. The infantry divisions in second and third line were actually tired out, by numerous night marches and painful advances over difficult terrain, before they were engaged; also their intervention, instead of producing a decision, only served to prolong the struggle. Means must be found to bring the reserves on to the battle field at the desired time, and in a fresh condition both physically and morally.

Finally, notwithstanding the outcome, we must admit that instructions of Ludendorff produced a most judicious solution to the problem of the offensive, under the conditions which this problem presented in 1918 upon our front. While admirably taking advantage of every innovation, there was full cooperation in putting into effect those few broad principles which are always true -- surprise, speed, concentration of means. Particularly from the tactical point of view, all questions, which are often so delicate, concerning the offensive either against organized positions or in open terrain, were faced and solved in a simple and practical way (artillery preparation, counterbattery, destruction and neutralization, rolling barrage, employment of the infantry, reduction of centers of resistance, etc.). All methods were based upon a very accurate idea of the preponderant role played by the infantry in battle. Luckily for us, the value of the German infantry, which already was no longer with the penury of effectives. Furthermore, in spite of his qualities as an eminent tactician, Ludendorff would not believe either in the action of tanks or of cavalry in battle; these were the two errors which were to consummate the loss of the German Army.

II. -- Second Phase.

The second phase, which began on 18 July, with the French counteroffensive, extended to the Armistice of 11 November and includes the development of the victorious general offensive of the Allies.

But before taking up its study, we must go back to the preceding period in order to examine the conditions under which the Allied troops, and particularly the French troops, held off the great German offensives of the spring of 1918.

I. -- The first engagements in open terrain (beginning with 24 March, 1918). -- We know that, beginning with their 21 March offensive, the Germans succeeded in carrying the battle into the open. Our first divisions, which came up from the 24 March, to block up the breach and to reestablish liaison with the English, therefore had to operate in open warfare, and nearly always, very precipitously without having undergone preliminary training, as the Germans had undergone. Also, in spite of their very elevated morale and their incomparable bravery, they exhibited manifest inexperience in this sort of battle. It could not have been otherwise, after more than three years of position warfare, which had given birth to the too widespread conviction that the trenches would never be abandoned.

The sudden change from the conditions of trench warfare to those of open warfare disoriented everybody (not to mention the gravity of the situation which became complicated with difficulties which are inherent to any defensive operation).

First of all there was the lack of information of the enemy or the vagueness of this information and the fluctuations of an essentially mobile situation, uncertain, confused, resulting from the rapidity with which events followed one another. Whence the obligation for the command to formulate its plan, particularly in accordance with what it wished to accomplish, rather than in accordance with the hostile situation (1). This plan must therefore be preconceived, but very flexible, so that it may be adapted to the situation of the moment. Orders, if they go into too great detail, run the risk of being worthless by the time they reach the executants. What troops need above all in such circumstances, are the intention of the commander, the general mission of the whole force, and the particular role that the unit to which the order is addressed is to play in the general operation. Under such conditions the high command can make itself felt, down to include the corps, by instructions rather than by orders; as for the execution, we must have the courage to turn that over to the initiative of subordinate leaders (beginning with the division commander), particularly in an improvised defensive (2).

As a result it is impossible for the executant to carry out even defensive operations in which the whole conduct of the defense has been premised on future eventualities; on the contrary, he must be guided by circumstances and take advantage of those which are presented, constantly improvise, in a word, organize the attack or the parry on the battle field and within a few hours. Hence no more detailed plans, but very short orders, shorn of all details which will be taken care of by the subordinate echelons.

In addition, the fronts of engagement of large units are more extended than in position warfare; also, combat groups are formed which are separated by intervals covered only by fire. As a result the infantry at times has a feeling of isolation, to which it must become accustomed (3).

In addition, the infantry could no longer count upon the immediate and constant support of the artillery. In the first place, in fact, a number of divisions had to be engaged before the arrival of all of their artillery; and, in the second place, when that artillery was in position, it did not have enough ammunition available to respond to the many missions demanded of it in position warfare. Also, in many cases, the infantry must dispense with the assistance of the artillery, both in the defense and in the attack; it must realize this, and it must realize that this fact is not a reason for losing confidence in success.

As for attached artillery; because of the difficulties met with in bringing its action to bear in adequate time for the benefit of the infantry, in these active operations, for the first time, we were led to decentralization

(1) This, moreover is what the instruction of 28 October, 1913 contemplated when it said: "The situation is never established with certainty or completeness. Information often arrives too late; it is nearly always insufficient, often contradictory. In such cases the command can nevertheless fulfill its mission and impose its will upon the enemy only by firmly adhering to the broad lines of its plan. A leader who gives way to the temptation to wait, to put off action, until the arrival of more precise information, runs the danger of seeing his opponent tear aside the veil by decisive action.

(2) The same remark was made in the beginning of this study in connection with the open warfare operations of August and September 1914.

(3) On the other hand, it was observed that, on the defensive, an infantry division put up a good resistance on a front of from 4 to 6 kilometers. This was the situation beginning with 30 March in the 1st and 3d French Armies in the vicinity of Montdidier and to the south.

of the division artillery. Sometimes it was found under the orders of the commander of the divisions infantry, at other times it was parcelled out among the first line infantry regiments. This action, which had not been foreseen, but which was forced by circumstances, gave good results in this particular case.

What was still lacking in open warfare, was close and alternate means of liaison. It is true, all the means of information and of transmission could not be operated because of the lack of time to install them and of the fluctuations of the battle; nevertheless, aviation, radio, earth telegraphy, couriers, runners, etc., must supply the absence of the telephone.

Lastly, the plan directeurs were no longer available more often the 1 to 80000 map had to do both as a guide as well as for artillery adjustment.

On the other hand, we no longer had to fear either such powerful means of fire power in the enemy's hands, nor the use of gas shell in massive concentrations; the results of fire were therefore less severe; while they were still very great they no longer produced total destruction. The result of this was that we could take greater risks with the infantry.

The inaptitude of our troops for open warfare was, furthermore, brought out by one of the senior leaders of the French Army, who stated:

"The command no longer knows how to shake off the formula of position warfare, to break away from detailed prescriptions and multiple calculations which it has occasioned. When confronted by the unexpected, it remains confused; its action is marked by slowness and hesitation; thus, in most cases, it allows the most favorable opportunities for action to escape. It no longer knows how to act with speed.

"The only formulation which the infantry is now acquainted with are those of a rigid nature in lines or waves. It has lost the idea of maneuver. On the other hand, it has become accustomed to getting a degree of support from the heavy and light artillery which it is impossible to furnish to it in open warfare; it seems to be no longer able nor willing to do without such support. It is ignorant of its greatest power, of which maneuver makes it capable.(2)

"The artillery also has lost all idea of maneuver. For some time, it has developed but one activity; precision, to obtain which it goes to excesses in the application of methods which are impossible of execution in moving warfare. In addition, it is often caught unawares in the present battle. It does not know how to utilize terrain. When it is deprived of its telephones, it is totally out of liaison. It is no longer daring, and too often it waits for precise information before acting, and thus lets opportunities escape."

To sum up both the command and the troops, who had too long been deprived of their initiative, were no longer capable of clear perception in unforeseen situations nor to make a decision in accordance with the requirements

(1) On the other hand, it was observed that, on the defensive, an infantry division put up a good resistance on a front of from 4 to 6 kilometers. This was the situation beginning with 30 March in the 1st and 3d French Armies in the vicinity of Montdidier and to the south.

(2) And another high commander wrote in his turn: "The infantry is too much in the habit of passively following a barrage, which it thinks should create a void before it. This is not impossible; it must, therefore, remain alive and maneuverable. Even when it is provided with tanks, it should not expect them to accomplish everything, any more than it should of the artillery, but when it comes under the fire of a hostile machine gun, lies down and waits, inert, for something (just what, it does not know) to happen which may keep it along, is abandoning the battle; it refuses to display any will power or intelligence!"

of the instant. This was in spite of the fact that experiences at Verdun and on the Somme had shown that after the first assault, the next step in battle was conducted, if not completely in open terrain, at least upon or against hastily prepared positions.

Be that as it may, the commander-in-chief, properly disturbed by this situation, lost no time in prescribing (Note of 9 April, 1918) that instruction be guided along the ideas indicated by the Directive No. 2 bis. and by the chapter of the Instruction of 31 October, 1917 relating to "Development of the advance in open terrain."

Activity was particularly to be urged toward learning:

- to organize counter-attacks or offensive actions within the minimum of time;
- to formulate orders rather than plans;
- to give precise objectives to attacking units;
- to push the attacks through intervals between natural strongpoints, which should be taken by flanking and encircling movements;
- to concentrate rapidly executed fires for destruction upon these strong-points; and during the execution of the attack, to concentrate powerful neutralizing fires upon them, while favorable approaches to them were to be blocked off by means of special fires.
- to engage units on battle fronts sensibly broader than those laid down for attacks against fortified positions.

The note of 9 April stated: "To sum up:

- "Rapid and violent preparation;
- "Execution which shall make full use of the flexibility of the infantry and of the artillery.

"The artillery hammers the strong points of the hostile armor; the infantry seeks out the seams in it in order to get within it and to seize it from the rear."

It is certain that these ideas on maneuver in open terrain were excellent, although somewhat succinct. Unhappily, as in the case of the Directive No. 2 bis. of 30 December, 1917, the Note of 9 April, 1918 made its appearance too late to exercise an immediate action upon instructions. In reality, our troops had to review their apprenticeship in the face of the enemy. For, as General Mangin has aptly said: "The enemy is a good teacher, but his lessons cost dearly." "It was thus not without bitter losses that we were able to stem the great German offensives."

In the meantime, the commander-in-chief, supplemented the Instruction of 31 October, 1917 by an Annex No. III, dated 10 May, 1918, relative to the estimate of the forces and means required for an offensive action. This very methodical document was based on the study of objectives and the manner in which the enemy occupied the terrain. It contemplated varying allotments according to whether the action might be against a fully prepared opponent, one who had not yet been reinforced, or, lastly, one who might evade the menace of an offensive; that is to say, it was still a question of position warfare.

On the other hand, General Foch, doubtlessly remembering the lessons of the Somme, directed the attention of the commanders of the Allied armies towards an essentially active form of warfare, in which the method as embraced by the instruction of 31 October, 1917, should no longer find any place. In fact on 12 May, he wrote to General Pétain, with reference to the freeing of the Paris--Amiens railroad; "This means that our offensive cannot contemplate objectives which we ourselves limit or which are not far distant; that after stopping the enemy in Flanders, in Picardie and on the Somme, if we attack it must be to beat him, to disorganize him to the greatest extent possible; that a battle engaged by us for this purpose must be pushed with the greatest possible speed and to the greatest possible distance, with the utmost energy; that it cannot simply have for its purpose the betterment of the present situation. All these advantages will naturally result from a battle of extensive scope, which is vigorously pushed to that end. This form of battle is directly the opposite of a battle which we ourselves limit and halt, the latter is the antithesis of the attack, of the offensive spirit which should animate the whole army."

It would be difficult to define more clearly how to conceive and execute an offensive; but it must also be said that, since 21 March, the general situation had changed and on several parts of the front we were faced by only hastily organized positions.

In any event, the path was broken; the commander-in-chief resolutely took that path, and published a certain number of notes reviewing the procedure of open warfare, which were still known only by the officers "initiated in our pre-war methods and who, particularly in the beginning of the campaign, acquired experience in the form of combat in which our troops had to be trained without delay" (Note of 13 May) (1) At the same time, the new doctrine could not be published in its entirety until somewhat later, by the Directive No. 5, dated 12 July, 1918, that is, on the eve of the effective return of the Allies to offensive operations.

II. The return to simple, audacious and rapid procedure. -- The Directive No. 5, of July 12, supplemented by the note of 6 November, 1918, gave the new conception of offensive operations its definitive form. The Instructions of 31 October, 1917, which had become inappropriate to recent events, which became of secondary importance; it was now to be looked on as only a "Compendium of suggestions in technique, among which the command was free to choose. "From now on we were to be prepared to maneuver and to use simple, audacious and rapid procedure, which would assume:

- strategic surprise, by the secrecy of preparation;
- tactical surprise, by the suddenness of launching attacks;
- a deep penetration, then immediate and distant exploitation of success by speed and continuity of execution.

The Directive No. 5 made the guarding of secrecy "a question of honor" to all grades of the hierarchy. It recommended the employment of "simple and concise orders, which leave the greatest part to the initiative and temperament of each for the accomplishment of his mission."

Preparation by the artillery and air service "shall be as short and as violent as possible;" it will be of shorter duration inasmuch as we now have available considerable rapid fire, heavy artillery (2) and as the use of gas

(1) The cavalry itself was not forgotten, and very definite prescriptions were given for its employment, both in the defensive and in the offensive (Note of 24 June, 1918).

(2) The artillery program had allowed the assignment, during the winter of 1917-18, of one group of modern 155 Howitzers to the divisions (of the two groups provided for); and a regiment of heavy guns, consisting of two groups of 105's and one group of 155 Guns to the corps (of the four groups provided for).

and smoke shell will now permit of neutralization of the enemy's means (Artillery and infantry) instead of their destruction. This preparation may even be dispensed with, if we are assured of break-through action of the tanks.

As regards the execution of attacks, "speed is not a question of increasing the main rate of advance; but after difficulties have been foreseen in all their details, they must be methodically overcome; to make long advances, we must aim at distant objectives from the very beginning, without putting any restraint, a priori or in though upon the chances of success. Furthermore, the capture, as prompt as possible, of the mass of the hostile artillery, in every case, will be the surest guarantee of rapid and deep progress."

In order to secure immediate and distant exploitation of success, commanders of large units, will advance their reserves and will effect their intervention in the battle "in such a way as to assure continuity of effort and to prevent the enemy from reorganizing. At the moment of success, it will be kept in mind that the qualities of quick perception and decision are paramount; perception, will and rapid action are imperative." It points where a breach is desired, the infantry divisions will be engaged on fronts of less than 2000 meters; in other cases, on the contrary, on more extended fronts.

From the infantry there were to be demanded, "initiative, audacity and flexibility of maneuver in the advance, in liaison with neighboring units, but without regard to alignment. The infantry must feel that it is provided with weapons which allow it to exploit its initial successes and to continue its advance by reducing local resistance by its own means, without the support of the artillery."

The artillery is to displace forward "so as to assure to the infantry, during its deep penetration, not only constant support, but a support which shall be as powerful as possible.(1) It might be beneficial to place batteries or sections of artillery at the immediate disposal of division infantry commanders, regimental, or battalion commanders." This procedure, which had already been applied in the defensive, was often employed in our offensives, with general satisfaction so that a Note of 25 October, 1918 on the subject of the employment of division artillery, more definitely layed down the use of accompanying batteries or sections. The purpose of the note was to show the means of rapidly passing from the centralization of artillery in the hands of the division commander to its decentralization for the benefit of the infantry, and the reverse, so as to avoid having the battle degenerate into a series of local and uncoordinated, and hence sterile, actions.

Shortly after this, the Note of 6 November, complementary to Directive No. 5 reviewed the question in its entirety, with the remainder that efforts at rapidity and continuity should not lead to precipitate action and that excessive decentralization must not induce the commander to abdicate command by parcelling out, a priori, all his means among his subordinate units. In fact, decentralization is advantageous only at certain periods of the battle and commanders must always take time to coordinate efforts in order to avoid piecemeal action; in any event, when he sees that the enemy has reorganized, he must impose halt periods necessary for coordinating a new combined attack.

Directive No. 5, it will be seen, definitely crystallized all the principles which resulted from the experience obtained during four years of war:

(1) Thus, audacious infantry, knowing how to dispense with the aid of the artillery; artillery, whose constant and primary preoccupation is constantly to support the infantry--such seemed to be the true formula for the exploitation of success.

- principle of effort at strategic and tactical surprise;
- principle of maneuver, basis of every operation;
- principle of exploitation of success;
- principle of compromise between method in preparation and rapidity, continuity in execution;

Furthermore, the application of these principles observed the lessons drawn from previous operations:

--short and precise orders were to be preferred to plans; they were to leave every initiative to the executants:

--objectives assigned were no longer to be limited, on the contrary they were to be distant, so as to include and take in the bulk of the enemy's battery positions;

--the artillery preparation, short and violent, was no longer to attempt destruction but neutralization of the opponent's means; as its length could be calculated beforehand, it was no longer to control the time of delivery of the attack, but, on the contrary, was to be subordinate to it.

--the infantry resuming the principle role in battle, was to move forward with rapidity, even when temporarily deprived of the support of its artillery; to this effect, its means may be reinforced by accompanying batteries under its immediate orders.

--the artillery was primarily to keep in mind the constant support of its infantry; it was to regulate its forward displacements accordingly during the actual execution of the attack.

--finally, as soon as the battle begins to become uncoordinated, or when a new position is encountered, the command, which has not ceased directing the action, will again get its means in hand, will require a halt and will renew the attack.

We had thus returned to sane doctrine (1), from which a too long period of stabilization coupled with a lack of means had diverted us. It is this doctrine which from now on we were to practice and which, with new armies, created by the war, was to lead us to victory. It will be remembered that an attempt in the same direction was made beginning with the end of 1916; in fact, it is striking to note the analogy between the prescriptions of the Instruction of 16 December, 1916 and those of Directive No. 5. Unhappily, at that time our means were not yet sufficiently powerful, and furthermore, the doctrine was modified too soon, otherwise the operations of 1917 perhaps might have been more decisive.

III. Application to the offensive operations of 1918 and open warfare.-- The defensive operations of the Spring of 1918 having on several occasions given us the opportunity to go back to the methods of open warfare (21 March, 27 May, etc.), the French Army, when the time came for it to take the offensive, was fairly well prepared for that class of battle.

The offensive operations of the Allies began with the brilliant counter-attack of 18 July, long before prepared by General Foch. Immediately thereafter the Directive of 24 July prescribed a series of offensive actions for

(1) It will be seen that this is very nearly the German doctrine, but adapted to the means which tanks make still more powerful.

the purpose of freeing the threatened railroad lines, to reduce the salients driven into our lines by the enemy during his great offensives, and particularly, to wear down the opponent. (1)

The most important of these attacks was the Picardie attack, launched on 8 August on a front of 25 kilometers by the English, and which was supported on the south by the 1st French Army, then by the 3d. Hardly had the Germans been thrown back upon their old positions, when the battlefield was widened upon both wings; on the south by the thrust of the 10th Army (17 Aug.), on the north by the entry into line of two new English armies (21 August). From the first days of September, the enemy, pushed back to the famous Hindenburg position, had lost all the gains of his offensive of 21 March and 27 May, and had left more than 100,000 prisoners in our hands.

This initial result having been produced, Foch, who had been made Marshal on 7 August, without further delay prepared a general offensive of the Allied armies, which was to be characterized by increasing extent of fronts of attack and by the uninterrupted continuation and convergence of offensive actions. Furthermore, at that time he had available a marked superiority in number of large units and consequently of reserves, and in the number of planes, tanks, and even of pieces of artillery. On the other hand, arrivals from America permitted a ventable reservoir of men to be constituted in rear of the armies. Already, 1,150,000 Americans were in France, representing 27 divisions, fifteen of which were in condition to take part in the attacks. (2)

The Directive of 3 September prescribed three offensives involving a great part of the front between the Meuse and the sea, and which were to follow on one another at an interval of 24 hours; that of the Argonne, 26 September; that of the two banks of the Oise, 27 September; that of Flanders, 28 September.

This general assault brought home to the Germans the catastrophe to which they were exposed; the height of Flanders and the Hindenburg position were taken in great part, but the Argonne offensive was contained.

A new Directive of the Marshal, dated 10 October, planned the disengagement of Lille, the turning of the Hunding position from the north, and the renewal of the Argonne attack against the Brunehild position; these three offensives, delivered the 14th, 17th, and 19th October, were to have convergent directions, so as to push back the enemy upon the Ardennes Massif. In spite of the successes of the left and center, this result could not be obtained on account of the desperate resistance of the Germans north of the Argonne; but already they no longer had available the necessary transverse rail lines to move their forces, the center of gravity of which was to the west of the Ardennes (150 Infantry divisions out of 187); and the wasting away of their troops became more and more manifest.

The Marshal, feeling that the supreme moment was approaching, prescribed, by his Directive of 20 October, an offensive on the two banks of the Moselle, in the direction of Luxembourg and the Sarre, so as to throw the enemy upon the Meuse and to back him up to the Rhine. At this time the allies had 250 divisions at their disposal, 103 of which were in reserve, while the Germans had only 184, only 17 of which were in reserve. The Lorraine offensive was set for 14 November, but on the 11th the Armistice was signed; "by a capitulation."

(1) General Foch will coordinate the action of the 19 Allied armies placed under his orders which represented a total of more than six million men.

(2) The American Army, whose assistance had been offered on 23 March, 1918, by a spontaneous gesture of General Pershing, immediately approved by his Government, had already distinguished itself in the Spring battles, where its divisions, placed under French command, had gained brilliant success. Its first feat as an independent army was to take from the Germans the famous Saint-Mihiel salient on 12 September (15,000 prisoners, 465 guns).

lation in the open field the German armies escaped disaster" (German Mangin) (1).

This sketch of the period of the victorious operations of the Allies, though condensed and incomplete, will however, allow us to point out certain essential points.

Marshal Foch proceeded by a succession of shoulderings in (2) or offensives, each of which consisted of several attacks launched with little interval of time between them, and which characterized by their width of front and by the rapidity with which they succeeded one another (3).

The fact was that he possessed sufficient means in personnel and in materiel simultaneously to provide for each of these offensives, without being obliged, like Ludendorff, to take means away from some of them in order to provide the necessary means for others (4). Such was the consequence of the superiority of our means over those of the adversary. In addition, these offensives were conducted so as to avoid the creation of narrow and deep salients, which had been shown to be extremely dangerous for the assailant.

It can thus be understood, how, under this continuous pressure, the German high command might have been embarrassed in the direction of its reserves in adequate time and to an opportune point. What is certain is that these reserves were very rapidly becoming exhausted. On 15 July, 1918, out of a total of 207 German divisions, 81 were in reserve, 43 of which were fresh. On 25 September, there were remaining only 197 divisions, 67 of which were in reserve and only 21 of which were fresh. This was the time when Ludendorff counted upon his rear positions, which had been completely prepared, to give him a respite of a month in which to reconstitute his forces; but Foch was not to give him this opportunity. Also, beginning with October, the number of divisions in reserve did not cease to diminish, in spite of the fact that the front had been reduced 200 kilometers; but the effectives of the divisions had diminished to such an extent that the same number of divisions had to be maintained in line, while, on the other hand, the breaking up of divisions became inevitable. Under this conditions, it became impossible to provide the troops in line with the necessary rest, and a number of them fought for a month or more without relief; at the end of October half of the

(1) In fact, for this 14 November offensive, the Xth Army (Mangin) had available: 14 Infantry divisions; the 2d American Army to its left, 6 infantry divisions. In addition the Castelnau group of armies had 2 infantry divisions and 3 cavalry divisions in reserve. To oppose these 30 divisions, which were ready for the attack, the 19th German Army had only 9 infantry divisions, which the Duke of Wurtemberg could reinforce only after several days.

(2) une succession de coups d'épaule.

(3) Examples: The offensive of 8 August, conducted by the English on a front of 18 kilometers and by the 1st French Army on a front, at first of 7 kilometers and which was prolonged farther to the south on the 10th to a front of about 10 kilometers by the entry into line of the 3d French Army.

Then the operation was extended, on the one hand towards the south, on 17 August, by the intervention of the 10th Army on a front of 20 kilometers, and on the other hand, towards the north, on 21 August, by the extension of the English front on an extent of 35 kilometers.

Offensive of the end of September: the attack of the American Army and of the 4th French Army, on 26 September, on a front of 60 kilometers; the attack of the English armies and of the 1st French Army, on 27 September, on a front at first of 16 kilometers; the attack of the Belgian army and of the 6th French Army, on 28 September, on a front of 20 kilometers.

(4) During all this period, our army corps were supported for the attacks against fortified positions by a number of pieces of heavy guns which varied between 200 and 300.

divisions in line were played out; and the whole reserve consisted of only twenty divisions, half of which were tired divisions. Finally, on 11 November, at the time of the Armistice, out of the 184 divisions which were left, 17 were in reserve, only two of which were fresh divisions.

Just as the great German offensives of the Spring of 1918 had rapidly absorbed the Allies' reserves, so did the Allied great offensive of the Summer of 1918 rapidly use up the German reserves. But, while the enemy's effectives continued to diminish (necessitating the breaking up of 27 divisions between June and October), those of the Allies continued ever to increase during the same period; General Foch, who, on 18 July had available no other reserves than the few divisions which delivered the counter-attack, was able, by the end of October, to build up a mass of 103 divisions in reserve, thanks to the influx of American troops (26 divisions operating and 10 others soon to be available for action). Finally, while the morale of our troops did not weaken for an instant under the repeated blows of the adversary, that of the German units constantly lessened beginning with 18 July, 1918.

One of the great services performed by the Marshal was to have the 2d Sections (1) follow with great attention and detail this progressive weakening of the adversary's effectives and morale; the intelligence, which was thus furnished him, allowed him to plan his operations with constantly increasing daring and continuity (2).

Realizing that, to put on his great offensive of 15 July, the enemy now had on the rest of his front only units which were tired, incomplete or of poor quality, he wrote: "This is a weakness of which we must take advantage by undertaking important offensives." Later, after the operations of the month of August, he noted the exhausted condition of the hostile forces and no longer hesitated to launch his general and convergent offensive of September (Directive of 3 September). Lastly, as the successes achieved coincided with more and more accentuated disaggregation of the German units, he gave the operations the speed of a real pursuit by prescribing that the troops should be given only attack directions and that they were to give the enemy no respite, once they had closed up upon him (Directive of 18 October) (3).

The different offensives of the Allies were of nearly the same character: they started with the attack of a fortified position, which most often was very strongly organized, from which the defender was expelled, and from which he fell back, disputing the terrain as best he could, to the next position. As a result, the attacker had to apply successively the methods of position warfare, then those of open warfare, the two being quite different as to the means to be used, methods to be followed and qualities to be exploited. Hence

(1) Les 2^e bureau.

(2) This audacity was apparent beginning with the offensive of 8 August, in the British armies as well as in the French armies, who did not hesitate to conduct the attack with their units in sector, as they had only a small number of fresh infantry divisions, which were held out for exploitation of success. It was thus, for example, that our 1st Army attacked with its 11 infantry divisions, more or less worn out, supported in second line by only 4 fresh infantry divisions.

(3) Furthermore, the general situation urged him to such action: On 14 September Austria had proposed a separate peace; in the days, from 15 to 25 September the Macedonian front had been broken, and at the same time the Palestine front had been dislocated by the English. Lastly the Bulgarians were ready to desert their allies, while the Turks were loudly clamoring for help.

the necessity for special training for these two kinds of warfare, the instruction of troops being complete only when they are apt at the one kind of warfare as well as the other. They thus had to know the Instruction of 31 October, 1917 as well as the Directive No. 5, which supplement each other. The command had to be the judge of the application of these prescriptions according to the circumstances of battle.

Furthermore, the command and the troops did not hesitate to wholeheartedly adopt the simple, daring, and rapid procedure which had been laid down by the commander-in-chief. "It is time to shake off the mud of the trenches", announced General Mangin; and General Debeney, on the eve of the offensive of 8 August, was not afraid to write this typical expression, which does him the greatest honor: "I approve in advance every act of initiative, no matter what its result may be" (and this was not with reference to the exploitation of success, but to an attack of an organized position.) Everywhere, effort was made to develop order and the offensive spirit, in order to produce rapidity and continuity in the execution of attacks. It was at this period, moreover, that the action of the infantry was facilitated, on the one hand by the use of yperite shell which had been so long expected (since June 1918) and, on the other hand, by the appearance on the line of the light tanks.

After having made their appearance on 31 May at the edge of the Forrest of Villers-Cotterets, where they helped to hold the enemy, they were employed in mass, beginning with 18 July, in the majority of the offensive; the infantry seeing in them the true accompanying arm, demanded more and more the support of light tanks each time they were called upon to attack.

IV. The defense of positions. -- 1st On the German Side. -- Beginning with 18 July, 1918, Ludendorff, forced to pass from the offensive to the defensive went back on several occasions to the principles laid down during the preceding year. Attributing the success of our counter-attack to the effect of surprise produced, to the action of our light tanks and to the insufficient resistance of his infantry, he looked for new remedies for a situation which he felt to be more and more critical; hence his notes of 22 July, 11 August, and 4 September.

In order to avoid surprise, "in order to know the situation of the enemy, there must be much more activity than formerly in the capture of prisoners and of terrestrial observation. The greatest vigilance is necessary at daybreak and during the early morning hours, as surprise attacks are generally launched at that time." (11 August) "Early information that an attack is in progress must be obtained; the alert of all arms must speedily follow; and fire, particularly that of the artillery, just be put down without any delay against the most important objectives." (22 July) (1).

(1) Ludendorff, after having laid down in principle that "the infantry by means of its own forces alone is able to completely repulse the attacks of the hostile infantry, if it makes adequate use of its machine guns", had already defined the role of the artillery in the defensive in his Note of 20 April, 1918: "The role of the artillery which is engaged in the forward area", he said, "consists primarily in systematically attacking the hostile artillery with the aid of the organs of observation (fires for destruction), then in executing fires of annihilation upon the hostile infantry which has been discovered, as well as harassing fires and gas bombardments."

In his Memoire of the end of September, he again dwelt upon that role and stated it in these terms: "accurate firing has much greater value than firing a great number of projectiles. The most important objectives are the living objectives, and full consideration must be given to the importance of good observation. An automatic and non-observed fire, fired in response to a signal from the infantry, cannot be considered. Such fire cannot be put down in an unbroken line and without gaps over the whole front of our infantry, as was done in the old barrage; it must be concentrated upon the zones which the enemy occupies when the fire is opened. Counter-preparation fire, which is opened at a tactically opportune time in response to a definite order, fires which are well adjusted and observed, are of greater benefit to the infantry."

In order to oppose our tanks, the artillery was to increase the number and the echellonment of its anti-tank guns: "The tank is an easy prey for artillery of all calibers." (11 August). In addition, the infantry was to receive special rifles with an armor-piercing bullet, and Minenwerfer units specialized in such fighting (creation of a company of light M.W. per infantry regiment). Lastly, if it is not always possible to completely organize advanced lines, it is indispensable that the work on terrain situated farther in rear progress with greater speed, the strong points must be transformed as rapidly as possible into a continuous line. "It is absolutely inadmissible that tanks, which have penetrated the advanced lines, without encountering either obstacles or resistance, should push along the roads or along sides of them for kilometers as far as the division command posts." (11 August)

In order to increase the resisting capacity of the infantry, Ludendorff thought of providing it with a new automatic arm, which should be more hand than the light machine gun; this was the machine pistol. (1) But, above all, he recommended "to combat in every way the troops aversion for digging"; and he again dwelt upon the idea, which was too wide-spread, that it is easier to defend an improvised position than an organized position. "This viewpoint must be energetically opposed", he said. We can never have too many trenches nor accessory defenses in the defensive." (22 July)

However, Ludendorff was well aware of the fact that, faced by the elements of superiority of the Allies, the causes of the weakness of the German infantry lay primarily in the dearth of effectives and in the diminution of the combat value of the troops. At any price, losses had to be cut down and the morale of the army had to be elevated. He thus showed himself more disposed to cede terrain without resistance. Taking as an example our defensive operations of 15 July, he wrote: "Irruption into our lines at places where we are not fighting to gain terrain are of no importance, provided they are automatically stopped farther in rear. At such points we must be more reconciled than formerly to abandon at an opportune time the advanced zone without any idea of retaking it. In case of major attacks, according to circumstances, to evade the attack on a grand scale without any regrets (2) at other points, and under other circumstances, battle must be delivered". (22 July). It is the province of the commander to decide; as far as the troops are concerned, they must always defend the terrain which is confided to it with their last bit of energy, when they have not received orders to the contrary.

These prescriptions were put into practice on several occasions by the Germans during the summer of 1918, but they did not produce great results. The Allies were perfectly acquainted with that tactics since they had successfully used it themselves, and were not taken in by it. After pushing back the outpost of the advanced zone by means of detachments or advance guards, and gaining contact with the real position of resistance, they deployed their means only against the latter, which did not resist powerful assaults (3). Thus, Ludendorff was seen to become somewhat puzzled

(1) le pistolet - mitrailleur.

(2) This is the famous theory of the "elastic defense", which the German press had already begun to present as the infallible means to break down any attack.

(3) Examples: (a) For the attack of 17 August, the 10th Army found the Germans heavily echeloned in depth; their true line of resistance was from 3 to 4 kilometers in rear of the first trenches. On the 17th the artillery preparation was begun against that line, while our infantry divisions in sector seized the covering zone on the 17th and 18th August. From the night of the 18th to the morning of the 20th, all the artillery of the attack was displaced forward (36 hours); on the 20th, at 7:10, the assault was made against the position of resistance, which was taken that day.

(b) Likewise, on 25 September, our IVth Army and the 1st American Army faced by a disposition which was greatly echeloned in depth. The artillery preparation commenced the night of the 25th and on the 26th, at 5:25 AM, the Allies commenced their attack. Simple detachments advanced in the hostile covering zone and reduced the weak obstacles which were there encountered; then the assault line formed at considerable distance from the position of resistance which it captured on 27 September.

as to the value of his system of defense and particularly as to that of the covering zone. In a Memorandum of the end of September with reference to the new edition of the regulations for position warfare, he said, in effect: "It is not possible to prescribe an advance zone in all cases, although the advantages which it offers (ability to give timely alarm, to disorganize the attack, to deceive the enemy as to this deployment for the attack, to give security against surprises and envelopments) makes it apparent that the use of some form of advanced zone should not be given up. On the other hand, such use entails the disadvantage of dispersing the infantry of the defense and of making the use of artillery difficult. As a general rule, it may be stated that the depth of the advanced zone should be normally, between 1000 and 1100 meters. When the advanced zone is deeper, in certain cases special rear guards must be established (1). The greatest importance is attached to the offensive action of all arms. The enemy must be surprised and deceived by the measures taken by the defenders. "Nothing is more true than the last phrase, but to produce this result, a system cannot be adhered to for an indefinite time, for, when the enemy gets on to it, the system will no longer work. Just as the Allies in 1917 adapted themselves to the tactics of divisions of intervention, so in 1918 they adapted themselves to the defensive tactics based upon the use of a covering zone. To surprise and deceive them something else would have had to be discovered.

Also, with the idea of reducing losses, Ludendorff again insisted that "counterattacks should be delivered only when there is a chance of their success." (4 September) "The employment of troops of intervention in the battle under unfavorable conditions, leads solely to useless losses." (22 July) "It is as faulty to give orders that, in principle, methodical counterattacks or counteroffensives should be delivered as it is, in principle, to give up counterattacks. Counterattacks which are delivered too late break down, as do also methodical counteroffensives which are insufficiently or too quickly prepared. Both are grave errors of command." (Memorandum of end of September).

Lastly, in order to elevate the morale of the troops, Ludendorff constantly prescribed the development of the vigilance and offensive power of the infantry (2), requiring vigorous discipline in all troops (3), but also the use of benevolence: "Success in battle depends upon discipline and organization, and not upon numbers. As a consequence, the principle purpose of the high command should be the maintenance of moral value of the troops. It will succeed in this by examining, in a spirit of benevolence, the reasonable complaints which are addressed to it. Surveillance should be

(1) He had already said in his note of 4 September: "If a great deal of terrain cannot be given up, we must be satisfied with a shallower covering zone."

(2) He thus ended his Note of 22 July: "But the best principles are useless if the vigilance and the offensive force of the troops are deficient. The primordial and decisive conditions of a victorious defense are, in the last analysis, the vigilance and the offensive power of the infantry; from it the maximum must be required; that is why all echelons must give the greatest attention to its development and to maintaining it in condition."

(3) "It cannot be repeated too often that good troops, well in hand by their leaders, have shown themselves incontestably superior to our adversary in spite of his new means of battle. A vigorous discipline, a strong determination must therefore be required of all troops" (Note of 4 September).

exercised in a more confident manner. Distrust destroys the sense of duty and the mutual understanding between the command and the troops; confidence builds them up and confirms them." (Memorandum of the end of September). . The German high command must have been hard put to it in the face of proofs of material and moral disintegration of its army to abandon its harsh measures which it had previously made use of; and to counsel its superior echelons to use benevolence and solicitude, as a means of reawakening confidence between the command and the troops.

But it was too late and, in spite of all of Ludendorff's efforts, the German army remained unable to hem in the advance of the Allies. The infantry, in particular, lost its combat value with alarming rapidity; it was no longer equal to the terrible exigencies of modern combat.

2d On the French Side, following the German offensives, note had been made of the full value of the prescriptions of Directive No. 4 and of the Instruction of 24 January, 1918, which had been substantiated in a remarkable degree on 15 July. The necessity for creating a more continuous defense, in order to avoid infiltration, was fully realized.

As a consequence, the command prescribed that the simple parallel of observation (1) be replaced by a true position of observation (2), to withdraw the position of resistance to some distance from the hostile front and to have the divisions in sector hold the whole of both of these positions. The position farther to the rear, the old second position, became a barrier position (3) and was to be held by a security garrison taken from units other than those in first line, until the arrival of reserve units who would then proceed from that position to reinforce the defense of the position of resistance or who would retake lost elements of that position by means of counteroffensive.

V Conclusion. -- 1st The most positive lesson which can be deduced from the operations of 1918 is unquestionably the following:

The rupture of fortified fronts is entirely practicable, if we have a marked superiority available and if we know how to exploit the favorable, but relatively short period of time which follows the initial success.

In addition, exploitation of success must be one of the main considerations of the command. It depends, as we have seen, upon the following principles:

a. Demand of the infantry the will to push straight ahead and to the greatest possible distance, by convincing it, that with the means with which it has now been provided, it can temporarily dispense with the assistance of the artillery. The more confidence the infantry has in its means of action, the greater will be its offensive capacity.

b. Require the artillery to displace forward rapidly, so as to follow the infantry as closely as possible and to insure, continuously if possible and without delay, the support of the infantry by its fires; this requirement naturally demands that special steps be taken for the rapid reopening of routes, dispositions which thus assume capital importance.

c. Prepare the cavalry for the decisive role which it is called upon to play in open terrain against a more or less disorganized enemy, taking

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- (1) paralle de surveillance.
 - (2) position de surveillance.
 - (3) position de barrage.

advantage of the fire power, increased by the speed and mobility characteristic of that arm.

d. Furnish the command in adequate time with reserves in good physical and moral condition and in numbers ample to insure that the attack shall go forward rapidly and uninterruptedly.

Develop in all grades the spirit of initiative, decision and above all, the taste for responsibility.

e. Use simple and rapid means of liaison, which will allow the infantry, particularly in open terrain, to secure prompt artillery fire on definite objectives which are holding it up (1).

The experience of 1918 thus had demonstrated not only the possibility, but the importance of exploitation of success, which up to them had been so much contested; at the same time it exposed the fallacy of the fatal theory of the inviolability of fronts with all the no less fatal consequences of that theory.

2d. The offensive of Ludendorff, as well as those of Foch resulted from the same directing idea: absorb the hostile reserves by multiple attacks following each other with as short intervals as possible, after which the hostile fortified front will crumble of its own accord. This was the theory of the Instruction of 31 October, 1917, supplemented by special measures for the exploitation of success. In spite of the excessive intervals of time which separated his offensives, Ludendorff on two occasions was on the point of obtaining the result he was seeking: the first time, just after 9 June, when the Allies had no fresh reserves with which to oppose him if he should attack a few days later on no matter what part of the front; the second time, on the eve of 15 July, if he succeeded, thanks to surprise, in gaining in Champagne a success comparable to his successes of 21 March or of 27 May.

It is of very little importance to know whether Ludendorff's strategic conceptions were justified or not, or even if he had any strategic conception; the facts are there to show that if he had been able to or had known how to take advantage of these two favorable opportunities, the allies would have been hard put to escape disaster.

And Foch was successively faced by the same problems beginning with 8 August; but, better equipped than his opponent, having a constantly increasing superiority in means, animated by a daring which was fully justified by the falling off in value of the opposing army, he exploited his opportunities to the maximum without allowing himself to be influenced by the existence of previously constructed positions in rear. In fact, these positions which had caused us some uneasiness, and which were inherently strong but which were insufficiently garrisoned, were soon overrun and did not serve the enemy to the advantage which he had expected of them; a new proof that positions are of no account in themselves, no matter how numerous or how strong they may be; everything depends upon having available at the opportune time the troops capable of defending them.

3d. Contrary to what we have noted up to this point, the power deployed by the attack, instead of continuing to increase, now seemed to have reached its summit, at least as regards to the artillery, after having reached its maximum in 1917. In fact, for the operation of La Malmaison (23 October, 1917) the artillery available reached its height: 33 to 34

(1) This problem could not be satisfactorily solved in the war; the difficulty was gotten around by attaching field artillery units to the infantry.

batteries per kilometer, of which 18 were heavy artillery, and not counting trench artillery or heavy G.P.F. artillery. The Germans did not attain such density in their offensive of the Spring of 1918; in the 27 May offensive, in which the artillery means reached their maximum, this density did not exceed from 31 to 32 batteries per kilometer, of which 15 to 16 were heavy batteries. In the great French offensives of the Summer of 1918, the difference was still more appreciable; from 24 to 26 batteries per kilometer of which from 14 to 15 were heavy batteries on 8 August (31st Corps, 1st Army), from 21 to 22 batteries per kilometer of which 10 were heavy batteries on 26 September (21st Corps, 4th Army); and there were many instances where this artillery density was still less (from 11 to 13 batteries per kilometer on 10 August in the 34th Corps, 3d Army).

On the other hand, the power of the attack continued to increase in air service and in tanks. In particular, the light tanks, which made their appearance on the battle field on 31 May, developed with marvelous rapidity. While in January, 1918, there was in existence only one battalion of light tanks, (75 tanks) in August 15 battalions (1100 tanks) took part in the operations, and in November the French armies had at their disposal 25 battalions or more than 2000 tanks, exclusive of those furnished to the Americans. On the whole our tanks took part in 105 defensives or offensive engagements during the year 1918; this tells the story of their share in the victory.

4th. Lastly, the events of 1918 furnished new proof of the fact, already noted, that the offensive is less costly than the defensive. In fact, during our defensive operations, from 25 March to 30 June, that is, in three months and eight days, we lost 410,000 men (145,000 killed or missing and 266,000 evacuations), and during our offensive operations, from 1 July to 11 November, that is, in four months and eleven days, we lost 478,000 men (110,000 killed or missing and 358,000 evacuations).

The comparison of the figures of permanent losses, 145,000 as against 110,000 during these two unequal periods is convincing. It is furthermore noted that the 110,000 killed or disappeared during our offensive operations occurred as follows: 75,000 for July and August, and 35,000 for September, October, and November; which indicates that losses are much less in the attacks in open warfare than in those against fortified positions. Ludendorff, in his Memoirs, expresses the same idea; to judge from the figure of prisoners taken and the vast amount of materiel which the Allies took between July 18 and 11 November (more than 260,000 prisoners and one-third of the artillery), it cannot be doubted that the losses suffered by the German Army during its defensive operations must have been extremely heavy.

CHAPTER VII

THE POST-WAR DOCTRINE AND THE NEW REGULATIONS

After this review of the evolution of ideas, we must come to a conclusion: what shall be our post-war doctrine?

In order to define it completely, we would have to take up step by step each point of strategy and tactics and make an examination with respect to each point of the lessons of the war not only in our theatre of operations but in all other theatres. Such an undertaking would go beyond the scope of our present analysis and would be too imposing a work to serve as a conclusion to this modest study. Furthermore, some of these lessons have been presented in the course of our consideration of the principal events upon our front; we shall not revert to them.

In conclusion, we shall rather emphasize a certain number of points which have particularly impressed us, and which seem to us should constitute the basis of our doctrine for the elaboration of new regulations. We shall limit our examination to these few important points which we shall call: the general lessons of the war on our front, first with respect to open warfare, then with respect to position warfare; from them we shall deduce a conception of the offensive and how our new regulations should be built up.

In the early part of this study we indicated that the offensive was the basis of our pre-war doctrine. It may not be out of place to sum up the principles upon which offensive operations were to be conducted, they will thus serve us as a point of departure for the discussion which follows.

These operations were to be characterized by:

1st. Mass, to be the stronger in proportion as the economy of forces may have been observed;

2nd. Surprise, prepared and aided by:

Secrecy of operations,

Maneuver (particularly in envelopment),

Rapidity of execution, which is given considerable importance, but which must observe the essential principle of team work between the various arms upon the battlefield.

3d. Exploitation of success, which was accepted as a pursuit which was to be as rapid and as vigorous as possible;

4th. Moral superiority, which exercises a preponderant influence in battle.

Lastly, whether on the offensive or on the defensive, the principle of security was to be rigidly observed in order to avoid surprise; with the enormous front of modern armies, the defensive might in fact be employed by a part of the forces, but only for very definite purposes:

--either to cover the concentration of the means,

--or in order to release effectives for the purpose of reinforcing attacks which might be projected upon other parts of the front.

To sum up, our Regulations prior to 1914 were emphatic in directing our minds towards the offensive, to the detriment of the defensive, which, as it was to be used exceptionally, was pushed into the background, and with it, all questions which referred to the defensive (plan of defense, use of fortifications, etc...). Furthermore, speed, rapidity of execution, was considered as an essential factor of success, to the detriment of method, which always results in certain slowness.

1st. - General lessons of open warfare.

Open warfare, which was experienced for some months in the beginning and toward the end of hostilities, brought out certain points of doctrine, which must be considered in the future.

A. -- The preponderant importance of fire. -- Fire power, that is the destructive effects of fire, too often ignored during the early days of the war, was soon to be one of the most important factors of battle; and this power continued to grow in vast proportion with the adoption of new rapid fire materiel and the development in automatic arms. War thus has become much more destructive than it had been, since every mistake, every improvisation, every false move upon the battle field is immediately and impitiously punished. However, since the effects of the fire are generally to be feared less in open warfare than in position warfare, we may proceed with more audacity and rapidity in the former than in the latter.

In order to reduce losses caused by fire, experience has led, not only to the creation of a more powerful materiel of war, but also to the employment of means which may improve the circumstances of battle. Such means are principally the use of fortification of the battle field, which has become general; a more complete and more methodical preparation of operations; and the adoption of less vulnerable combat formations.

1st. - General use of fortifications of the battle field. -- Field works, too much neglected before the war, were so effective that all troops who are temporarily stopped in battle must as a matter of duty shelter themselves and intrench. We have gotten away from the preconceived idea that if we permit the combatant to dig-in it will later be impossible to get him to go forward. Von Freytag-Loringhoven very correctly wrote: "The war has shown that the assertion, which was too widespread in peace, that the spade digs the grave of the offensive is not true" (1). Thus the use of fortification has become a means of combat which has become of as much use as the other means upon the battlefield. The soldier must therefore learn to handle his intrenching tool as well as his arms.

However, we should not believe that fortification, in spite of the importance which it has assumed, has such intrinsic value that it may constitute a purpose of operations; it remains what it has always been, a means of fighting, a valuable and effective auxiliary to the combatant, it is true, but only an auxiliary. In fact it is of value only by virtue of the use made of it or the use which can be made of it. At one period of the war it seemed we might believe that we could prolong the war indefinitely by the use of fortified positions judiciously echeloned in rear of the front. The operations of 1918, both on the French and on the German side, have shown the value of that theory by proving that defensive organizations are of value only if their defense can be assured in ample time and by troops of good quality and in adequate numbers. General XY wrote (2): "Fortification plays a capital role from a strategical point of view by allowing him to effect economy of space and forces in covering his concentration. But this role owes its importance only to its relation to the troops in question; furthermore, there must be complete accord between the defensive organizations installed and the troops which occupy them, otherwise the dispositions will crumble like a house of cards."

2d. More complete and more methodical preparation of operations. --

A reverse results in such losses and so lowers the morale of the troops, that

- (1) Deductions from the World War.
(2) Reflections on the Art of War.

in our preparations we must place all the chances on our side and conduct the operations with a certain amount of prudence. Hence the command must not only have available the necessary and adequate means to produce the result which it proposes, but also:

-- to prepare the operations by much looking ahead, so as to avoid excessive hazards,

-- then to execute with order and method, so as to produce union of the arms and coordination of effort upon battlefields.

These precautions, which must be observed during the preparation as well as during the execution of operations, cannot help occasioning a certain degree of slowness, in the action, but this must not be allowed to rob the action of rapidity and continuity, which also are essential factors of success. As we shall see later, the command in each particular situation of the battle must reconcile these two contradictory ideas-method and rapidity.

In any case, if preliminary arrangements and a slowing up of the action are capable of eliminating all unexpected and dangerous situations, it would be illusory to think that these methods can eliminate all risks from battle. No matter what precautions may be taken, battle always involves a degree of the unexpected which it is idle to attempt to eliminate.

3d. Adoption of less vulnerable battle formations. -- Lastly, a third means of diminishing the dreadful effects of fire consists in the adoption of less vulnerable battle formations. Beginning with the first encounters we had noted (1) that our formation as skirmishers at one pace interval gave too great density, and nevertheless we noted that it remained the same until the beginning of 1916. The interval between men was then doubled, but it was still too small, and it was not until sometime in 1916 that it was increased to from 4 to 5 paces, thanks to the appearance in service of new automatic arms, particularly the automatic rifle (2).

This interval of from 4 to 5 paces between skirmishers seemed, furthermore, to be the maximum if we wished also to retain a certain degree of cohesion in the battle line. In fact, we must keep in mind not only the difficulty of the leader, no matter how small the unit may be, in controlling a thin line of skirmishers stretched out over a broad front, but also the natural needs of our soldier who does not like to fight isolated and who likes to feel at all times the presence of his neighbors; also, although the introduction of the combat group has facilitated the exercise of command on the firing line, the interval between combatants must not become exaggerated, otherwise they will soon feel that they are isolated and will have a tendency to halt.

B. -- Necessity for intimate liaison between the different arms. -- Battle in open warfare, as well as battle against fortified positions, requires an intimate union of all arms upon the battlefield, but the character of that union has been made definite; it must operate for the direct benefit of the infantry, which remains the principal arm, and must exclude all partisanship of arms. Today armies have available such perfected agencies of information and such powerful instruments of war that, save in very exceptional cases, the infantry is exposed to massacre, unless the other arms, particularly the artillery and air service give it devoted and continuous support.

In fact, it is the business of the command to insure that the infantry, which alone can seize and hold terrain, has the assistance of the other arms;

-- of artillery or tanks, to crush the obstacles which it encounters,

-- of aviation, to warn it of the dangers it may expect and to insure liaison with the artillery and the command.

(1) Note of GHQ, 24 August, 1914.

(2) le fusil - mitrailleur.

-- of engineers, to supply specialists which it itself lacks, and to install and keep up communications without which it cannot continue its advance,

-- of special troops, in case it encounters special difficulties,

-- of cavalry, to precede it and gather information.

Thus we may say, without exaggeration, that in battle all arms work for the benefit of the infantry, either in preparing or in supporting the action of the infantry.

But this union of arms, which at the same time insures the coordination and concordance of effort, can be accomplished only by numerous provisions and conventions which are established beforehand, and which in practice require the well understood and known multiple means of liaison and transmission.

We have noted what a long time was required to evolve a really practical and effective solution of the problem of liaison on the battlefield; and even then, a solution was only completely evolved in the case of position warfare, favoring method and slowness in operations. In open warfare, although the development of the action had now become slower and more methodical than in the past, the position of the front line undergoes more frequent and more rapid changes, which disturb the functioning of certain forms of liaison; it becomes very difficult for the artillery, for example, to meet the needs of the infantry within the ever restricted limits of time, and this difficulty will persist until we shall have found a process of liaison between the infantry and the artillery, which shall be both instantaneous and which can function in the midst of the fluctuations of battle. Until now we have overcome this difficulty by reinforcing the means of action of the infantry and, when necessary, adding to it artillery units which are placed under its direct orders; but this is only a roundabout solution of this very important problem, which still remains a very pressing one.

C. -- The degree of initiative to be left to the executants. -- In spite of the order and method which have been applied to it open warfare is made up of situations which are essentially mobile, uncertain, confused and which always contain a certain element of the unexpected, even of surprise. Every attempt which has been made to eliminate this contingency from battle has failed; or rather this attempt has been reflected in the results of the operations; they have been forced to a voluntary limitation in the end to be obtained. In spite of everything which we may do, we are thus unable to eliminate from battle certain risks which have to be taken; they form part of the very essence of war.

In order to confront these risks, this unforeseen element, a single means seem possible: develop the initiative of the executants, that is to say, of those who actually have to solve these difficulties and who, being on the ground, are the only ones who can estimate the situation and who can render a decision; this is truly a right which belongs to them and which must be respected by the command in every echelon of the hierarchy.

We should be thankful that we had nothing to regret as to initiative displayed by our subaltern leaders in 1914, on the contrary, in the beginning of 1918, we had to deplore the disappearance of that quality, which happily was only dormant and which was not slow in making its reappearance.

We shall see, in our discussion of the question of "methods of command", that we are generally not temperamentally disposed to leave to the individual the amount of initiative which he has a right to demand; in every case, in order to make judicious use of initiative, every leader should know at least the intentions of the authority immediately superior to himself, should have received a definite mission to accomplish, and should be left free choice of the means of execution.

D. -- The meeting engagement has not disappeared. -- It is true that once the belligerents have made contact and have been located along their whole front, a meeting engagement will be very difficult; but before this phase appears, starting consequently from the time contact is gained, many engagements will have the character of meeting engagements. This was the situation in the beginning of the war at several points, during the battle of the frontiers (on the Sambre in particular), during the battle of the Marne (on the Ourcq for example), and the period of the race to the sea (September -- to November, 1914); these were nothing more nor less than a succession of meeting engagements; we can even cite many cases in position warfare in which units, thrown into the battle in order to reestablish a compromised situation, found themselves under conditions which were analogous to those of the meeting engagement (particularly after the German offensives of 21 March and 27 May, 1918).

For, these particular conditions are characterized by the fact that while we have a clearly defined mission to accomplish, and as we have not yet made contact with the enemy, we are ignorant of his intentions. We may thus expect to meet this enemy in position, find him in movement, or finally to be attacked by him. In any case, the first operation always consists in reconnoitering the enemy, in making contact with him through the agency of outposts if we are halted. It is this double problem, which until now has scarcely been recognized, that we must study.

1st. Reconnaissance and gaining contact by advance guards. -- We have seen that one of the results of fire power has been to impose method and a certain slowing up in the development of the battle itself; but it also exercises an influence on the preliminaries to battle, reconnaissance of the enemy and the gaining of contact by the advance guards. In fact, today the commander of a large unit is no longer justified in having his advance guard take the risk of total or partial destruction in order to obtain positive information of the enemy (1); this would amount to starting the battle with a check and to depriving his forces in a considerable part of his effectives (between 1/5 and 1/3) in the battle which is to follow.

In order to avoid this risk, instead of reconnoitering the enemy with the advance guard alone, we might devote the whole of the large unit to that mission; but this situation seems to be justified only in the case where the opponent has decided to deliver battle. In other cases we risk making useless or even false deployments, in case for example, we should find ourselves confronted by a simple mask without any consistency, which would disappear as soon as the large unit should have made all its dispositions to feel it out. Would this not be playing the enemy's game? For, by repeating these tactics several times, he could cause the large unit in question considerable fatigue which he himself would carefully avoid. It is true that such action would avoid the risk of partial destruction, but we would run the risk of wearing ourselves down and of bringing into battle forces which are in bad physical condition.

Is it not better to employ the old system, which is always sound because it is essentially rational? This system requires the commander to seek a certain amount of information before making the decision to engage the bulk of his forces. This is the principle of reconnaissance of the enemy by only a part of the troops, a principle which will be found throughout our pre-war regulations.

Furthermore, we have said this reconnaissance has become more and more difficult and dangerous by the increase of fire power; consequently: more precautions must be taken, we must proceed with more method and we must require each arm to furnish only the information which it can secure.

(1) Even if, as the field service regulation states, the decision to fight has been made by the commander of that large unit previous to the engagement of his advance guard.

The air service can furnish many items of information of a general character, particularly with reference to conditions in the ~~rear~~ areas; but the information which it collects as to the disposition which the enemy has made (location of troops, strengths, etc.), particularly in open warfare, are usually not sufficiently detailed to give an idea of the tactical intentions of the opponent.

In its turn, the cavalry, which under such circumstances always precede large units, can indicate only the apparent contour of the enemy; that is, it can report a line of fire which is practically continuous and which it is not able to penetrate; and sometimes it can determine the flanks of this line.

This continuous initial intelligence, but it is not yet sufficient. The commander before he makes his dispositions to accomplish his mission, must know if this line is not a simple screen, of no density, or depth, which is intended to deceive him as to the true intentions of the enemy, and to induce him to make a blow in the air. This the cavalry has not the means of telling him (1); and, nevertheless, we do not wish to engage all of the large unit to find out.

The only means left to us is to engage only a part of our forces, which must include troops which are able to procure this information, moreover, such troops must be employed in sufficient strength; that is to say, we must use both infantry and artillery. And, since the risks to be taken are great, we shall use only weak infantry forces, but we shall support them by large forces of artillery. These detachments which will thus operate in advance of the main body and which will be charged with making contact with the enemy and with the effective reconnaissance of the enemy, may be called advance guards or front line battalions (2), the term used to define them is of little importance. On the other hand, as we want to avoid sacrificing these troops before the battle takes place, we shall place the bulk of the force so that it may be able to support them by its fire, to form a rallying force in case they are checked, and, if necessary, to accept battle. Consequently, the bulk of the force will be advanced as close to the advance guards as may be necessary to insure that the advance guards do not get out of range of its artillery; that is to say, all the artillery will be deployed and will be covered by part of the infantry. This partial deployment of the main body will be made as late as possible, but always when the advance guards enter the zone of hostile light artillery fire.

Such are the precautions which may be taken to spare the advance guards the danger of being isolated when they encounter the destructive effects of fire. Now let us take up the method with which the operations of gaining contact and of reconnoitering the enemy should be conducted.

An initial contact has been made by the cavalry, but it is too loose and many points too indefinite; closer contact must be made. Hence, the first mission to be given to the advance guard will be:

to relieve the cavalry,
to push in to closer contact with the enemy;
then, when this operation has been completed, to proceed to reconnoiter the opponent, that is to say, to feel him out, in order to find out if he is in force and has made up his mind to resist.

During these two operations, the advance guards will be supported, when necessary, either by all or a part of the artillery, that not in action being in readiness to go into action, in accordance with the orders given by the commander of the large unit. In every case the latter will have selected

(1) In spite of the more powerful armament with which it is now provided; and all the more so in the beginning of the war, when nevertheless, it was given mandatory missions of this character.

(2) For example: an infantry division might thus employ one battalion, two at the most.

a position of resistance for his main body in case of attack, and it is in rear of this position that he will have deployed his artillery so that it may be available both for the advance guard action and, if the case arises, for the defense of this position.

Let us now go back to the reconnaissance mission which has been assigned to the advance guards. In order to obtain the information which it is seeking they must attack, but, as they are unable to attack along the whole front of contact, they will concentrate their efforts only on one or two points of this front. These points will have been selected and designated by the commander of the large units so that the capture of these points shall place the enemy at a disadvantage in the defense of this position (dominating point, important observation, etc....). It will thus be a question of carrying out against such points what our old field service regulations termed "offensive reconnaissance", and what we now term "raids" (1). In each of these operations there will be used very little infantry (one company at the most) and all the artillery considered necessary. So that, in case the raid fails, we will have lost only a few sections of infantry; as for the artillery, although it is true, a rather large force has been used, it will have expended little ammunition, since it will have been in action only a very short time (2).

If these raids succeed and if the enemy fails to react, he will soon be forced to evacuate a line, whose most important points he no longer holds; this will be the proof that he had in this position only an advance line without density. If, on the contrary, the enemy replies to these attempts by vigorous reactions (artillery fire, infantry actions), which repulse us from the position, it will be apparent that he holds the terrain in force and that he has decided to defend it. In either case, the commander, at little expense to himself, has the information which he needs to engage the battle: The enemy is holding or he is not holding on the line of contact.

In case the enemy gives ground, the advance guards will follow him as far as a line which has been previously determined, and which corresponds to the limit of range of the artillery, and beyond which only the cavalry and some infantry patrols will penetrate. The advance guards will execute a new bound in advance only when the commander of the large unit has selected a more advanced position of resistance and has moved his artillery up to that position. The advance will in this way proceed by successive bounds until the advance guards come in contact with determined resistance. (3)

To sum up, gaining contact and reconnaissance of the enemy by the advance guards, as well as the eventual progression of the latter beyond the line of contact, should be effected under the protection of all the artillery of the large unit; this artillery must consequently be deployed from the very beginning of the action; it will be covered by only a few infantry units of the main body pushed up to the line of resistance, which, at the same time, they will outline for use as a line of resistance in case the defense of this position becomes necessary. The rest of the infantry regiments only take up a formation in readiness for battle, that is to say, each of them is given a direction within its sector (a march or defense alternative) in rear of the position of resistance, while at the same time the leaders make the necessary reconnaissance. This disposition is much more supple than a deployed formation, and allows the infantry of the main body to use the roads in its advance and thus save its energies.

(1) *Coups de Main.*

(2) Unless the enemy himself takes the offensive, but then the battle will be in progress.

(3) The halts which the advance guards will be forced to make, however, will be rather short if the successive positions to be occupied, in case the enemy falls back, have been selected in advance and if the artillery displaces forward progressively.

2d. Protection afforded by the outposts. -- According to our field service regulations, the purpose of outposts was to insure the protection of troops at a halt. To this end they were to secure the most advanced camps (1) from hostile artillery fire; and, in case of attack, to make sufficient resistance to give these troops time to make their dispositions.

Today, under the changed conditions of battle, such complete protection can no longer be required of the outposts. In the first place, the range of light artillery has been so increased that we cannot expect to locate the camps beyond the range of its fires, unless the outposts be placed at much too great a distance from the troops they are to cover. Furthermore, the incursions of hostile bombardment aviation which must be expected make the crowding of troops into villages extremely dangerous. Lastly, now more than ever (and this is also a consequence of the increase in fire power), all troops in the outposts must be considered as sacrificed in case of attack by the enemy.

As a result of these conclusions the protection furnished by outposts is illusory, on the one hand because they are unable to cover the troops from hostile fire, and on the other hand because, being reduced to the indispensable minimum, they are all the less able to resist in case of attack and to procure for the commander the time necessary to make his dispositions for battle.

We are thus led to conclude:

a. As to the main bodies, that the dispositions taken at halts should be modified. These troops will be afforded even slight security only by avoiding cantonnements in villages, (by scattering out and concealing themselves in the cover of the terrain, meadows, patches of woods, sunken roads, quarries, etc.)

b. As to the out-posts, that they must be given a mission which is compatible with the service they are capable of rendering, namely to protect the main body from surprise by opposing the incursion of hostile patrols during the normal periods and by giving the alarm in case of attack. In the latter case they will fall back as best as they can and in directions which have been decided upon in advance, covered by the fires of the main bodies.

Thus, as the outposts are in general no longer able to fulfill the mission of protection and resistance in case of attack which the field service regulations assign to them, will be reduced to a simple role of alarm curtain; under these conditions their strength may be readily reduced to a low minimum which should however be sufficient to provide a continuous line of fire with some degree of depth. On the contrary, every means of liaison will be installed in order to insure the rapid transmission of information, and, in particular, the signal of the enemy's attack.

At the same time, although the resisting mission which formerly devolved upon the outposts is now more difficult to fulfill, it does not follow that this mission should be completely abandoned. For example, in open warfare, when close contact with the enemy has not been made, outposts, even of reduced strength, can very well, thanks to the new armament, resist the enterprise not only of the cavalry, but even of detachments of hostile infantry; and, as a result can by fighting gain the necessary time for the main body to occupy its position (2). On the contrary, in position warfare, the outposts,

(1) Cantonnements.

(2) Examples of this kind were given us by the Germans, on the one hand during the course of their withdrawal to the Hindenburg position in February, 1917, and, on the other hand, during their retreat of 1918 in front of our victorious armies.

if we thus designate the troops who occupy the line or the position of observation, are at the mercy of a surprise attack in force, and are thus unable successfully to fulfill their mission of resistance; nevertheless, they must always oppose hostile enterprises of a smaller scale by fighting. To sum up, the outposts should resist in place, except in case of a general attack delivered on a large scale. It is then the function of the commander of the outposts to recognize this situation and to order the withdrawal of the outposts in accordance with conditions which have been previously studied and foreseen.

Lastly, there are numerous situations in war in which the main body, at least for some time, must be protected not only from annoyance from cavalry, but also from hostile artillery fire, for example, to complete its debarkment, to organize defensively a position, etc. In this case, the outposts, or if you prefer, the covering detachments, should be pushed out to a greater distance, should be stronger (in infantry and artillery), and should be assigned a very definite mission of resistance; but the farther they are pushed out from the main body and the longer they are required to resist, the greater will be the risks they will have to run in case of attack. It will therefore be the function of the command, in each particular case, to judge whether the sacrifices which must eventually be made are proportional to the importance of the result to be obtained.

2d. General lessons of position warfare. -- The general lessons of position warfare result, for the most part, from a fact which had not been foreseen and which dominates the whole question, that is, the prolonged duration of hostilities.

The first consequence involved was to give the fighting a form which had not been expected and which has been styled: trench warfare or position warfare. And, this new form, at least for us, because of its long duration, has given rise to so much controversy that, before going any farther, to decide whether position warfare and open warfare should be considered as different forms of warfare.

A. -- Should position warfare be considered apart from open warfare?

We must first of all establish the fact that there are not several kinds of war, each of which has its own particular purpose which is different from that of the others. War has never had and can never have but one purpose, no matter what the form of the operations may be, that is the annihilation of the forces of the opponent.

It is true that since the adoption of the principle of the "nation in arms", it is possible only partially to obtain this result. In fact, since the military power of a nation at war is no longer composed only of its organized armies, but of the resources of the whole country, we can hope to destroy that power only by a succession of efforts or battles of long duration, in which the reserves, fatally attracted, become progressively used up. If then the annihilation of the living forces of the enemy can no longer be produced in the first engagements, it remains no less true that in each defensive or offensive battle we must seek the usure and, if possible, the annihilation of the forces which are opposed to us. Thus, battle, which is the "essential act of war" (1), remains an immitable work of destruction, in which each of the belligerents seeks:

-- on the one hand, by making his opponent suffer as much as possible by inflicting losses upon him and in shaking his morale (whence the enormous development of the means of destruction);

-- on the other hand, by protecting himself to the greatest possible extent against the effects of suffering and of destruction (whence the search for protective means which each day become more effective: fortification, armor, tanks, etc.);

(1) Conduct of large units, 28 October, 1913.

-- and it is this double purpose of every operation of war which has again brought about the famous struggle between the shell and armor.

To sum up, position warfare and open warfare, both of which were manifested in the same violent and brutal act of battle, are one and the same as far as the purpose sought is concerned; but they are no longer one and the same if we consider the means which they adopt to attain that purpose. We shall not review again the difference which characterize them and which give to operations their special form depending upon whether they are against fortified positions or in open terrain. Furthermore, position warfare is nothing more than the extension of the old siege warfare (controlled by rules appropriate thereto) to operations in open campaign. It is therefore natural that different procedure in combat should correspond to situations which are totally different, that is to say, a different tactics. As a result, as we shall see later, in order to be complete, the instruction of troops should include the teachings of the two particular tactics; one on open warfare, the other on position warfare.

B. -- Importance and more frequent use of the defensive. -- Just as war may assume two different forms, battle itself also includes two different attitudes, which have long been recognized: the offensive attitude and the defensive attitude. However, as we have seen, prior to 1914 the defensive in low favor in France, had been neglected and was not given a prominent enough place in our regulations. The incidents of the war, to the contrary, brought out the full importance and usefulness of the defensive; during the three and a half years of position warfare, attacks were rare, but we had to be ready for defense every day; similarly, in open warfare operations, fronts are so extensive and the offensive requires such large effectives, that it is impossible to attack everywhere; the defensive attitude must therefore be observed by a part of the forces, while waiting until they in their turn can take the offensive. Being thus called upon to pass alternatively from one to the other of these attitudes, the troops must know how to fight as well in one case as in the other. Also, defensive battle also has its own combat procedure peculiar to itself, that is, a tactics of its own; thus, whether we consider position warfare or open warfare, it deserves study and a place of its own in our regulations on an equal footing with the offensive.

However, regardless of the importance and the usefulness of the defensive, we must make no mistake as to the results which can be expected from it.

The essence of defensive battle is, in sum, submission while the essence of offensive battle is to impose its will on the opponent. As a result, losing the advantage of the initiative, the defender may be surprised; the great danger in the defensive is therefore surprise. Another disadvantage comes from the fact that the troops of the defense are generally inferior both in materiel and morale to the attacker, who, is always attempting to attack their weakness, with his strength; except in the case of immediate reinforcement, the defender, at least in the beginning of the battle, has available only greatly limited means.

On the contrary, the defense enjoys some advantages. In the first place, if he is vigilant, the preparations for attack should not be able to escape him; it has at its disposition a period of delay in which to make its dispositions to ward off the attack. Then it has the advantage over the attack of complete knowledge of the terrain on which the battle is to take place; having organized it to suit itself, it can use the terrain so as to compensate to some degree for its numerical inferiority (1). The strength of the defense

(1) Examples: the Belgian army at Merkem (17 April, 1918) which made skillful use of prepared switch positions as bases of departure for its counterattacks; the English at Givenchy (9 April, 1918) who by means of well prepared section counterattacks repulsed battalion attacks; lastly, the famous example of the IVth French Army in Champagne (15 July 1918).

thus resides in the detailed preparations of a well thought out plan and in the utilization of terrain which it alone knows.

Lastly, the defensive, in seeking to contain or to stop the enemy with fewer effectives, contemplates using up the attacker in greater proportion than it itself will be used up; a very laudable purpose, but one which experience does not always confirm (1); as we have seen, the battle of Verdun, the Somme and those of 1918 have shown that the defensive is very costly, more costly than the offensive.

It can not be denied however that the defensive battles delivered on our front generally attained the purpose which they sought: to stop the enemy; but we must conclude from this that the defensive can procure decisive victory. The events which transpired on other fronts, as well as on our own, in 1918, proved that defensive tactics is not infallible. Furthermore, it would be materially impossible to preserve in the armies a high morale by maintaining them for too long a time on the defensive; forced to submit, even though more or less victoriously to the assaults of the enemy, the troops feel themselves at the mercy of the latter's enterprises and become discouraged faster than is thought. In order to preserve its morale, the army needs positive successes, and only the offensive, by the evidence of results obtained (terrain gained, prisoners taken, materiel captured) and by the palpable proof of the superiority of its means over those of the enemy, is capable of procuring them for it. To prevent the enemy from attaining the purposes of his offensive is a result; but it is, in a way a negative result. In war, in effect, it is not so much a question of thwarting the will of the enemy as it is of imposing our own will upon him; this is why the defensives, sometimes inevitable, it is true, must be considered only as a makeshift no matter how active it may be, and to be employed only temporarily at the risk of submitting the army and the country to one of the most dangerous moral tests.

C. -- Increased duration of battles; its consequences. -- A simple review of the relative operations incident to position warfare shows that the great battles thereof which were waged over a much longer period of time than we could expect from the experience of previous wars; this duration varied from several weeks to several months, including halts in the action. Even in open warfare the great battles were prolonged beyond all expectations. This increase in the duration of battles resulted in the absorption of a greater number of large units and required that they be replaced even during the course of the action without disturbing the effective direction of the battle; hence the necessity of an organization possessing sufficient suppleness to allow the command to conduct the battle from beginning to end with all the desired continuity.

What then will this organization be?

We know that the infantry division, composed of all arms, is the only one of the large units which is capable of fighting under the direct orders of its leader. It is the attack unit, or combat unit, as you wish, that is to say, the instrument utilized by the command to exert the successive efforts required by the battle; but the division generally becomes used up too fast to be able to furnish these repeated efforts throughout the duration of the battle. Furthermore, experience has shown that it is advisable not to leave a large unit in first line until it has lost all combat value. (2) We are thus led to accept

(1) Practically, to get this result, we must not get below a certain density of occupation; it is true, the defense allows economy of effectives, but it does not take their place; the events of 27 May, 1918 were proof of this. It is generally admitted that to resist victoriously a major offensive, the defensive must have in first line about one infantry division, with the appropriate artillery, per 4 to 5 kilometers of front.

(2) Ludendorff laid down and practiced the opposite system in his great offensives in the spring of 1918; we have indicated the disadvantages as regards the lapse of time necessary to reorganize the large units after the battle.

replacement of divisions, during the actual course of the action, as many times as is necessary to attain the result in view.

As to the army corps, it directs the battle within its own zone, in accordance with the viewpoint of the army, by utilizing the divisions which are placed at its disposal. Also, in spite of all the advantages of having the infantry divisions fight under the orders of the army corps to which they pertain, the army is forced to neglect them and to draw on its reserves where and when they are needed, without considering the organic composition of the army corps (1). In any case, since to fulfill its mission, the army corps must exert a permanent action throughout the duration of the battle, it remains definitely in the battle, as opposed to the division which merely appears in the battle in a transitory way.

Lastly, the army exerts a superior direction over the battle; it is seconded in this task by a certain number of army corps, among which it allots its battle front. In addition, it is a veritable reservoir of forces, intended to be engaged according to the needs and the accidents of the battle in order to maintain the execution of the plan of operations.

Under these conditions, the army corps plays primarily the role of an organ of command, having a tactical mission to fulfill; and for this purpose receiving the means which the army considers necessary, and which it has only to put in action. Its administrative role with respect to the units which are thus placed at its disposition becomes of secondary importance; particularly as when these units have been sufficiently used up, they are returned to the army which assumes the responsibility for their reconstitution. Consequently, there seems to be every advantage in reducing the staffs of the army corps, by reducing the number of officers in the 1st and 4th Sections, (2) whose role should consist solely in keeping their commander informed upon the materiel situation of the units; these units will requisition directly on the army, which, in most cases, is the only authority capable of filling them; this will result in economy in time and work.

As for the infantry divisions, which must be interchangeable, they should be, as far as possible, identical and should contain organically everything which they need to live and to fight; this will not prevent adding to them such reinforcing units as may be deemed necessary when they go into battle.

D. -- The contest between method and rapidity of execution. -- In discussing open warfare, we stated that the increase in fire power required more method than formerly both in the preparation and in the execution of operations. In position warfare, to this factor which was already known, there was added another factor, namely, the strength of defensive organizations; this, also, demands more vigorous method, not only in the preparation, but also in the direction of the battle. We shall not discuss the necessity, now everywhere admitted, for method in the preparation; it seems of interest, however, to examine in what respect such method may be applied in the execution. It must not be forgotten that, during the three years of position warfare, there was a constant struggle between the partisans of method and those of rapidity of execution in attack against fortified positions.

(1) This necessity is less imperative in open warfare in which the first line infantry divisions are less rapidly used up also it is easier to respect the principle of constitutive organization of the army corps, particularly if such corps consists normally of 3 or 4 infantry divisions, as was the case in certain ones of them at the close of the war.

(2) As well as the services which pertain to these sections.

The note of 2 January, 1915, which appeared after our first offensive against defensively organized positions, very properly created the opinion that, on account of the fire power and the strength of defensive organization, "operations are characterized by a slower and more methodical development." But, in applying this method, which was conceded to be necessary in all phases of battle, so much slowness was imposed upon the fighting, that it became impossible to exploit successes which were obtained. The note of 20 May said: the moment of success is fugitive, and the opportunity is lost unless the reserves are used immediately." In order to prevent the enemy, during the course of the battle, "from reorganizing in a stable and coordinate condition" (1), it is therefore necessary that the battle be conducted with a certain degree of continuity and that successes which are obtained be exploited with a certain degree of rapidity. At the same time, the note of 27 December, 1915 very properly brought out: "It is doubtlessly desirable that an offensive battle be conducted with rapidity so as to secure the maximum exploitation of the effects of the surprise, disorganization, and demoralization which has been produced by our initial success; but no considerations can overcome the fact of obstacles which are encountered, and which must be destroyed in order to permit the advance to continue." Thus the two equally important ideas of method and of rapidity in execution appeared as two contradictory conditions between which a choice had to be made, until the appearance of the Instruction of 16 December, 1916, which for the first time attempted to reconcile these two conditions.

In effect, this Instruction sharply differentiated two phases in the capture of fortified positions: the break-through phase, properly so called, battle within the defensive organizations, therefore a combined operation conducted by the command, and in which method must have the ascendancy over rapidity; and the phase of exploitation of success, battle in open terrain, in which command becomes decentralized, in which full initiative is given again to all subordinates and in which rapidity must take the ascendent over method, while respecting the good order necessary to success. Unfortunately, the arrangements for forward displacement of the batteries, although it had been provided for in detail, was not sufficient to insure the infantry the support of the artillery at any time desired during the rapid advance of the infantry; furthermore, even if this support could have been assured, really practical means of liaison were lacking to permit the infantry to secure the fires which it needed where and when it needed them.

We had to wait until 1918 for an acceptable solution to the delicate problem of reconciling method and rapidity in the phase of exploitation of success, that is to say, in open warfare operations against an enemy who is no longer in possession of all his means. As the artillery could not keep up with the infantry advance and at the same time insure the infantry constant and effective support, both sides decided, the French as well as the Germans, to reinforce the means of action with which the infantry was provided particularly by attaching to the infantry batteries which were placed under its direct orders, so as to liberate the infantry to some degree from the tutelage of the artillery. Such is the solution which it seems will remain in force as long as we shall not have found, either a process of liaison which will give the infantry the certitude of getting immediate response to its needs from the artillery, or an accompanying weapon susceptible of temporarily replacing the artillery support.

To sum up, method should prevail over rapidity in operations within fortified positions, and, in a more general way, in all general operations which are directed by the command. On the contrary, in the phase of exploitation of success, where the initiative of the executants plays such a large part, method must give way to rapidity, with the understanding that good order shall always be respected and that the resistances encountered by the infantry can be overcome without loss of time. These two latter conditions thus force us to proceed, even in this phase, with a certain degree of method, while operating with the maximum rapidity.

(1) Instruction of 26 January, 1916, on offensive combat of large units.

"Operate with method and rapidity by combining the action of the two arms (infantry and artillery)", these are the terms used in the Note of 24 August, 1914 to characterize the combat procedures to be used. These procedures, after having passed through numerous vicissitudes, were definitely formulated by the Directive No 5 of 22 July, 1918, in which the antagonism between method and rapidity finished by combining, by being reconciled in a happy formula which gave us the victory. The Note of 24 August, 1914 and the Directive No 5 of 22 July, 1918, thus mark the point of departure and the termination of the evolution of tactical ideas during the war, and thus the cycle is closed.

E. -- Usure of the infantry and corresponding increase in materiel and in machines. -- All long wars have witnessed a more rapid using up of the infantry than of any of the other arms; and an increase in materiel, particularly in artillery, which kept step with the wearing away of the infantry. (1)

This law was again verified during the late war and was even considerably accentuated due to the prolongation of position warfare, which required the use of the most varied and most powerful agencies of war. Machines thus attained such a place in the armies that the old struggle between the shell and armor could be called "war of materiel, or war of machines". In any event, this condition of affairs brought about the reduction of the infantry effectives in the division and gave rise to the idea that the man could be replaced by the machine; these are two ideas which are deserving of some attention.

1st. The three regiment infantry division.

Experience of the war has amply demonstrated the insufficiency of the former proportion of artillery in the division; but it has never shown proof that the former proportion of infantry in the division was too strong. If then this strength in infantry was reduced from four to three regiments, it was primarily, it must not be forgotten, because of the scarcity of effectives and of their absorption by the artillery, the air service, and by certain services, like the motor transport service. It is true to say that, on the other hand, that the reduction of infantry in the division did not introduce disadvantages because, at the same time, the infantryman was provided with a new armament which was much more powerful than that of 1914. Furthermore, the proportion of artillery and infantry in the division which was standard at the end of the war (3 regiments of infantry, 4 groups of light artillery, 75's, 2 groups of heavy short artillery (2)), seemed to be, a priori, very reasonable.

At the same time, we must note that the three infantry regiments (nine battalions) are just sufficient to conduct battle and to assure the security of the division artillery. But the division is generally a constituent part of the battle formation of an army corps, which contains organically a certain amount of artillery, which itself more frequently is reinforced by army artillery; and, as neither the army corps nor the army is provided with infantry reinforcements, it results, that on the battle field, the amount of infantry furnished by the divisions which are engaged become notoriously insufficient at the same time to conduct the battle and to assure security to such a mass of artillery. We are therefore forced to draw upon the battalions of divisions in second line, which are thus prematurely used up and are no longer immediately available.

(1) At the end of the wars of the First Empire, notably in 1814 and 1815 as Napoleon saw the effectives of his infantry decrease, he increased the proportion of his artillery. Von der Goltz indicates the same fact in these terms: "Weakening is observed particularly in the infantry, much less in the cavalry and the artillery. The principal arm diminishes more and more in importance. It was in reinforcing his artillery that Frederick the II recognized the only means of compensating for the melting away of the forces of his infantry."

(2) Artillerie lourde courte (A.L.C.) = howitzers.

On the other hand, the wearing down of a division in battle is measured by the wearing down of its infantry which we know to be much more rapid than that of the other arms; it can therefore be imagined that the three regiment division has not the capacity for fighting for a great length of time, particularly if we wish to avoid completely using up its combat value. As a result reliefs or passage of lines have to be made more frequently, which works to the disadvantage of the rapidity of the action.

Lastly, this rapid usure of the infantry necessitates strong reserves in each echelon in order constantly to feed the battle. And, in the three regiment division, it is more often impossible to constitute a division reserve, no matter how useful to the commander to make his action felt, except by robbing the first line troops of elements which are indispensable to them to meet the requirement of the battle.

For all these reasons, it therefore seems that it should be a real advantage if the division were again given its fourth regiment.

2d. The man and the machine. --

With the power of modern weapons, it is certain that if one of the adversaries enters the battle with inferior armament, the individual ability of the combatant can not be effectively used; his ability is paralyzed before it has a chance to show itself and it produces only sterile sacrifice. Armament, materiel, machines, therefore appear to be the condition sine qua non to produce combat efficiency of troops, but they do not replace combat efficiency. Battle may very well include fights in the air, artillery duels and, perhaps, at an early date, combats of tanks against tanks, it will always end up in an infantry action, which alone can bring about a decision. Thus, infantry action is, so to speak, the supreme argument of combat, the result of which it inscribes upon the terrain by the advance or the withdrawal of its firing line. The infantry thus indeed remains, in spite of the development of machinery, the principal arm, and, to use the consecrated expression, the queen of battles; in sum, it alone is capable of conquering, of occupying and holding the terrain, in position warfare as well as in open warfare.

True, the means of action of the infantry fortunately have been increased, which permits of economy in the human factor. It is furthermore conceded that its "rude and laborious" task should be lightened by the assistance of the arms which are provided with materiel which is capable of crushing the resistances which it encounters; but we cannot conceive, at least at the present time, that that task, which calls for so many qualities, so many warlike virtues, can be replaced by machines, no matter how much they may be perfected. As the Instruction on the leading of large units says, battle is, in the final analysis, "a moral struggle", that is to say a struggle between the two wills, in which the man naturally plays the principal part. That is why man remains, and will still remain for a long time, to use the forcible expression of Ardant du Picq, "the primary instrument of battle".

It is therefore apparent that the replacement of the man by the machine, effectives by materiel, which in certain arms and in certain services may be admitted without restriction, has its limits as far as the infantry is concerned, and that it can not be exceeded without producing grave disadvantages. Thus limits are imposed by the necessity of conserving in that arm a certain degree of mobility, without which it loses all aptitude for maneuver; consequently, we must avoid loading it down by adding to it heavy and incumbering weapons. For the infantry, the goal to be striven for may be summed up as follows: increase its power without injuring its mobility.

F. -- Introduction of new means of fighting. -- The prolonged duration of the war not only allowed the perfectionment and the increase of the armament already in service in the armies, but also gave an opportunity for the introduction of new weapons of war, to such an extent, as was said by M. Poincaré that "the war was a continuous invention". Among the numerous

innovations which made their appearance, we shall mention only those which were actually used upon the battle field. They were:

-- the employment of noxious gases of all kinds, particularly, in the form of projectiles;

-- the development of aviation; in a rudimentary stage when the war began and whose extraordinarily rapid progress created a new arm, the 5th arm;

-- the creation of antiaircraft defense (1), with weapons designed to bring them down;

-- the creation of camouflage service, whose purpose was to hide vulnerable objectives from observation;

-- numerous applications of the radio telegraph;

-- the development of the intelligence service, assisted by aerial photography and the employment of new organs (listening posts, ranging sections, etc.);

-- the creation of tanks, and as a consequence anti tank defense;

-- the vast increase in means of mechanical transport, particularly the automobile, permitting the rapid transport of important forces from one to the other of the battle field.

All these innovations placed within the hands of the command new means of combat, and increased the number of combinations which were possible upon the battle field; but they also complicated the mechanism of battle. Certain of them, by their surprise effect upon the enemy, would have produced large results, if they had not been prematurely attempted: Commandant Bouvard (2) says: "The appearance of toxic gases, of yperite, of tanks, if their secret had been guarded until they could be used in mass, was capable of producing general surprise, of producing a strategic crisis. At the time when there was a tendency to convert the belief in the inviolability of fronts into a dogma (a principle which died at its birth), special shell of great neutralizing power and squadrons of tanks would have permitted the covering forces suddenly to be broken through and complete surprise to be produced. But as the alarm was prematurely given in each case, the results obtained were limited". Since most of the discoveries of peace time may find application in war, this is a lesson for the future.

G. -- Utility of Cavalry. -- The role of cavalry in battle has not changed to the extent that may have been believed; in any event cavalry is far from being obsolete, as has too often been reiterated. It is, in fact, unquestionably the arm for the exploitation of success; and this has been demonstrated: as examples: the Marwitz groupment in Flanders in 1914, Schmettow's corps in Roumania in 1916, the English cavalry in Palestine, and the French cavalry at Solonici in 1918. If it was not used on this mission upon our front, it was either because it was materially impossible (its exhaustion at the battle of the Marne in 1914), or because the gaps which we made were not wide enough to let it get through.

However, at the close of a certain number of break-through offensives, cavalry units could have played an important part if they had been thrown into the breach which had been opened; for example, at Verdun (24 February, 1916), on the Somme (4 July, 1916), in Picardie (24 March, 1918), on the Aisne (28 May, 1918).

(1) D.C.A.

(2) The Military Lessons of the War.

It was therefore with soundness that our Instructions throughout the war never ceased to recognize the role to be played by the cavalry in the phase of exploitation. But, in order to fulfill such a mission, this arm must conserve the qualities which are peculiar to it; mobility and speed. Furthermore, these qualities permitted it to give the greatest service in the defensive phase of the spring of 1918 in plugging up the gaps made on 24 March and 28 May. At all costs, these qualities must therefore be preserved to it, and not, under the pretext of increasing its fire power, reduce its maneuvering capacity. With the armament which it had at the end of the war our cavalry was proficient in fighting dismounted, and, at the same time, could move about with all the speed desirable, and even fight mounted.

The question of transforming the cavalry into mounted infantry should, therefore, not even be considered. Furthermore, in open warfare, it is as useful as it ever was; if, in position warfare, the opportunities for its use are more rare, it is no less true, that when the time comes that we need it, nothing can replace it (1). Let us therefore maintain a cavalry which is ardent, rapid, animated with the offensive spirit and which can operate, as the circumstances demand, either dismounted or mounted.

H. -- Necessity for instruction. -- Once again instruction which has been given in time of peace, was shown to be of considerable importance upon the results obtained in battle. It is the errors and the gaps in this instruction to which our excessive losses in the early part of the war must be charged. On the other hand, we have seen how much time was required to remedy these errors; it is hard to change the direction of ideas once it has been established; and fixed habits, that is, routine, are not easily modified.

Examples are numerous, as:

- the necessity for infantry attacks to have artillery preparation;
- the necessity for thinning out the attack formation of infantry;
- establishing close liaison between the different arms in battle;
- training troops for the constant use of fortification;
- the difficulties encountered in passing from position warfare to open warfare in 1918, etc. . .

As a result, instruction to be given to troops in peace should approximate to the greatest possible extent the realities of the battle field (2); to this effect, none of the lessons of the war should be neglected, indeed, the results

(1) This is what the Germans did not understand; they sacrificed their cavalry to the necessities of position warfare and to the exigencies of the dearth of effectives. It progressively adopted the organization and the combat methods of the infantry and thus lost its own qualities; when the time came to use it in the great battles of the spring of 1918, it no longer existed as a special arm. Furthermore, the numerous Instructions of Ludendorff for the 1918 offensive do not mention a word on the role of cavalry in battle. The German army at that time had in fact only 3 cavalry divisions which were mounted, and these were held on the eastern front.

(2) We should avoid having to make the same observation which was made by the Russian, Captain Solovief, at the beginning of the Russo-Japanese War: "From the first fight in which I took part, I was convinced that many of the things which I had been taught in peace could not be applied in a real battle; and, on the contrary, there were many things that I now had to do which I had not been taught."

of the adoption of any new war material must be foreseen. We do not improvise in war; this is particularly true of leaders in the lower grades, who put into application hardly more than what they have been taught.

The war of 1914-1918 has demonstrated that troops must be apt in position warfare as well as in open warfare, each of which has its combat procedure, its own tactics; the means to be employed and the roles of the different arms are not the same. Hence, the necessity for two different kinds of instruction to teach the methods of offensive and defensive combat, both in position warfare and in open warfare.

Furthermore, every long war (and from now on, we must expect every war to be a long war) produces unforeseen innovations, which we must know how to meet as quickly as possible with appropriate methods intended to overcome or to neutralize them. Hence, the necessity for continuing instruction during the war itself, that is to initiate and to train the troops in the use of new weapons and methods. And, experience has shown that all the advantages which may be given by certain innovations are not always and at once recognized (the example of the use of toxic shell and tanks). It is for this reason that we must provide in peace for agencies (with their specialists) both to make research in new methods and weapons, and to teach their use.

I. -- Resume -- On the whole, position warfare had some favorable results for us:

- it allowed us to hold out and to bring our materiel up to the demands of modern battle;

- it revealed the importance of the defensive and the great advantage which can be drawn from fortification;

- it directed our attention to method, which we had sacrificed too much for rapidity.

On the other hand, it greatly helped to give false ideas on a certain number of points;

- for too long a time it led to a disregard of the influence of surprise, and caused us to lose sight of the necessity for exploitation of success;

- it revived the dismal theory of the inviolability of fronts; and created the belief for a time that position warfare was from thence the only possible form of combat.

- it appropriately modified the respective roles of the infantry and the artillery, but overemphasized that of the artillery, so that the infantry no longer dared to face battle unless it had the support of a formidable mass of artillery, beyond all proportion to its own strength; a pernicious school, which should have been presented as being a temporary necessity, while the infantry became accustomed to playing but a secondary role in the battle.

It required the tragic events of the spring of 1918, which reintroduced open warfare which had been for too long lost sight of, again to bring everything into its proper perspective.

3d. Present conception of the offensive.

The offensive remains (it would be superfluous to prove it) the only means of imposing ones will upon the opponent, and, in the last analysis, of obtaining a decision. But should the offensive still be conducted upon the principles upon which our pre-war doctrines were based? This is the question which it is important to examine.

A. -- The first of these old principles was Mass, and it has not disappeared. It is, in fact, still as necessary to be as strong as possible at the point where we wish to obtain the decision; we have even found out

that because of the long duration of battles and of the rapid use of troops, numerous reserves are now more than ever necessary; but we must banish from our minds the idea of mass as far as the use of these reserves upon the battle field is concerned. Their action will be manifested, not by letting loose an irresistible flood of effort, but by the renewal and the continuity of effort, which will be prolonged with all desirable power until the result which is being sought has been obtained, as was forcibly expressed by Ludendorff in his note of 30 March, 1918: "We must completely root out the idea that success can be forced by throwing in a mass of troops. This method leads to nothing but useless losses; numbers are not decisive, fire is decisive." Reserves are therefore important because they make it possible to nourish this fire and to maintain it at the desired degree of intensity as long as it may be necessary.

Thus, the principle of mass, always true, has been modified in its application because, on the one hand, of the necessity for continuity of effort, imposed by the length of battles; and, on the other hand, by the requirement that only the minimum of combatants be exposed because of the fearful power of fire. This is why the expression "principle of superiority of means", which, at the same time includes superiority in means, both engaged and in reserve and fire superiority.

B. -- The second principle which was of importance prior to 1914 was that of Surprise, which was proven to be as essential in position warfare as in open warfare. Unfortunately, efforts to secure surprise, which, however, had produced such vast results at the beginning of the war (battles of Charleroi and of the Ourcq), does not seem to have been kept sufficiently in mind by our high command, once it was faced by fortified positions; and, because of this fact, with our slow firing heavy artillery materiel which always required long artillery preparations, it was barely possible to secure tactical surprise. But we could have sought strategic surprise by maneuver which is always possible, no matter what the form of operations may be. The Germans, who were equipped, it is true, with quick firing heavy artillery, demonstrated this beginning with their offensive in Callicia (May, 1915), and, until the war ended they never ceased to use every means to secure surprise.

On the French side, it was practically only after the April, 1917 offensive that efforts at surprise became one of the principal preoccupations of the command and was considered as one of the essential conditions for success (Instruction of 30 October, 1917). From then on efforts were made to effect tactical surprise by the maintenance of secrecy, by reducing delays in preparations, by reducing the length of the artillery preparation and even by the suppression of the latter, if tanks were available; in addition efforts to realize strategic surprise were to be made by maneuver without which there can not be complete surprise and consequently no decisive success. (1)

C. -- Like the principle of surprise, the principle of Exploitation of Success was lost sight of from the first contact with defensively organized positions, or rather it was never mentioned, as everybody thought that once the position was captured there would be an automatic return to open warfare. However, when second positions made their appearance, the question of exploitation of success became a different problem than the pursuit pure and simple. This was not recognized until the end of 1916 in the Instruction of 16 December, and, unfortunately, the means available at that period were not yet

(1) There was no surprise in Artois (18 June, 1915, none in Champagne (6 October, 1915), none on the Somme (July, 1916), none on the Aisne (16 April, 1917), none on the Oise (9 April, 1918), and none in Champagne (15 July, 1918). But there was surprise at Verdun (21 February, 1916), at Cambrai (20 November, 1917), in Picardie (21 March, 1918), on the Aisne (27 May, 1918), south of Soissons (18 July, 1918, in Artois (8 August, 1918, etc. . . .

sufficiently developed to permit this phase of the battle to be pushed with all the rapidity which was desirable. It was not until 1918 that, first the Germans, and then the French discovered a really practical procedure which would insure rapid exploitation.

The phase of the battle took on the form, in effort of a series of pursuits, each of which followed the capture of a position and which did not stop until contact was made with new organized resistance farther in rear. We have seen that, for these periods of successive exploitation, there must be:

- decentralization of command in order to give the executants a great degree of initiative;

- rapidity must take the ascendant over method, provided that good order is still maintained;

- reinforcement of the means of the infantry so that it can temporarily dispense with the support of the artillery;

- provision for the employment of the cavalry, first by small units, then by large units.

But, exploitation of success mostly depends at least in its earlier stages upon the use of reserves. And this question does not seem to have been solved effectively during the war. However, opportunities were not lacking, because the break-through was effected on several occasions on our front; rather, neither side knew how nor were able to completely exploit the results.

Without going back to the beginning of the year, in 1918 we saw the reserves closely following the first line troops; but when they entered the battle it was not with that vigor which, taking advantage of the disorganization which the preceding fighting had produced in the enemy, should result in a decision.

In affect, the problem presented is as follows: After several days of fighting, to engage on that portion of the front where resistance is giving way, large units which are absolutely fresh, both physically and morally and which are consequently capable of rapidly obtaining a decision.

But, reserves which were engaged in 1918 generally had made quite a number of night marches during the concentration which immediately preceded the attack; they then made a difficult advance in rear of the first line divisions across torn up terrain, and, in addition, were inadequately rationed. At the time when they were engaged, they were more often tired out and could no longer furnish the violent and sustained effort demanded of them. Thus, as a result of their intervention the speed of the battle was hardly changed, and the change in equilibrium which was expected as a result of their intervention was not produced.

If we make a close examination of the present conditions of offensive battle, it will be seen that we do not have to have the army reserves follow the progress of the first line divisions step by step; this is a way of exhausting them physically before they become engaged. It would be better to hold, at least dismounted troops, in good cantonments fifty kilometers in rear of the front, ready to move by motors at an instant's notice. It is true, this scheme would immobilize quite a number of transport units, but it may be assumed that, in the next war, the motor transport service will have developed to such an extent that it will be able to provide this transportation without detriment to the other missions with which it is normally charged.

As regards the mounted units which belong to these divisions in reserve, from the beginning of the operation they should follow in the wake of the large units which are engaged, at a half day's march, and consequently always ready

to join their organization when needed. The superior commanders and staffs, it must be understood, should advance with the corresponding echelons of the front line divisions.

It may thus be imagined that army reserve divisions may be brought up to the battle zone within a few hours, in the night of the second or third day of the battle for example, without having lost any of their physical or moral value, and may be engaged on the following day by passing through the front line units under the most favorable conditions.

D. -- Lastly, the principle of Moral Superiority has maintained the primordial importance which has always been conceded to it. It alone, in part accounts for the long duration of the war; as long as the two opponents had a sensibly equal morale, their successes were but limited; but, as soon as it began to go down on one side, disaster followed disaster and foretold early defeat. It would require a whole study on this subject; such a study would show, from the beginning to the end of hostilities, with what care the French command was concerned with the cultivation and the exaltation of the morale of its troops. We may then say that victory was secured by that one of the two adversaries, who, in addition to superiority in means and skill of the command, the better knew how and could the longer, by its knowledge of men, keep up and conserve in its armies that moral superiority over the enemy, which makes victory certain.

However, it was not an easy matter to sustain, for several years, the morale of the combatant at the point required by the trials to which it was put and which made more and more demands upon him; the fatigues and privations of the daily life, dangers and suffering resulting from the growth of deadly fire power and of the employment of more and more perfected weapons - all of these continued to increase as the war was prolonged. In order to maintain his superiority over the enemy, the combatant, therefore, required ever increasing physical endurance and morale force, which nothing but the conviction that he was fighting for a just cause and mutual confidence between leaders and soldiers was capable of raising to its highest degree. Thus long duration of hostilities and the power of armament demand of all a moral temper which must be firmer than ever.

The several observations which have been made permit the conclusion that the principles of our pre-war doctrine have, in their entirety, been sustained; the few modifications which have been or which may be made in them will not change their general character; which has not changed for centuries.

In order to increase the chances of the success of an offensive, it will always be necessary:

- to have superiority in means; if not with respect to all of the enemy's means, at least upon that part of the front which is selected for the attack;

- to act by surprise, in order to preserve that superiority for the longest possible time;

- to know how to exploit success to the utmost, in order to draw from superiority, still further enhanced by the effect of surprise, the maximum benefit;

- lastly, to possess superiority in morale over the enemy, without which the combatant would soon become discouraged by the sufferings which he must undergo before victory can be obtained.

These are the principles which are always true and which have been called "The essential conditions for success", to which may be added certain

rules which have been dictated by experience, such as the necessity for complete preparation, the results of the employment of certain new weapons (tanks, airplanes), the choice of terrain for the attack and the selection of times of most favorable atmospheric conditions.

On the contrary, what has undergone most radical change, is the way in which these principles are applied upon the battle field; that is the tactics or combat procedure, which undergoes a continuous evolution with the perfecting of armament and diversity of the means which are put into operation. This evolution, whose stages we have followed, may be summed up in this general formula: "more method and less rapidity than in the past".

The hesitations, the feeling out and the changes, which we have noted in the adoption of combat procedure, were due to the fact that at every period we were forced to adopt the end to be sought to the means we had available; and a satisfactory solution was not always produced in the first attempt. We have seen how heavily the question of our artillery materiel bore upon operations; and to what extent the fluctuations of the struggle between projectile and armor, that is between the means of the attack and those of the defense, influenced the conception of offensive operations.

In any event, the principles which form the basis of our offensive doctrine still remain true. Let us, therefore, be careful about declaring as has been too often done immediately after great military struggles, that everything has changed and that we must make a clean sweep of the past; we would rather recall that very apt observation of General Langlois well before 1914: "We are too ready to see a revolution in the military art where there is simply an evolution in tactical procedure."

4th. What our new Regulations might be.

Is a change in the nature of our principal Regulations required? This is the first question which suggests itself.

Nothing which we have said up to this point would justify such change. In spite of their imperfections and gaps, they very judiciously separate questions of a general character from those of a particular character. Today, as well as in 1914, it appears necessary to make this classification, which leads to the formulation of regulations or instructions intended for the use of:

-- the high command, with reference to the conception of operations and the conduct of large units;

-- all arms (1), with reference to the execution of operations and the conduct of small units;

-- each separate arm, with reference to the operation of its special characteristics.

Admitting this view, it will be easily seen, as was said in the beginning of this study, that it is a question bringing up to date the regulations pertaining to the command and to the combined arms, while the separate regulations of each arm require complete recasting. We would thus have:

-- an Instruction on the conduct of large units;

-- a Decree establishing regulations for the armies in campaign, or a regulation on the employment of small units, common to all arms;

-- a series of Regulations with reference to each separate arm, old or new (infantry, artillery, cavalry, engineers, air service, tanks) or each specialty (telegraph, gas, anti-aircraft defense, etc....).

11/20/29-vel (1) The combined arms -- TR.

At the same time, it would be appropriate to add to the regulations which are common to all arms, those which cover certain questions of a general nature, whose importance became apparent during the war; for example, instruction on liaison and the use of field fortification.

Some thinkers, properly convinced of the necessity for coordinating the action of the different arms and particularly between the infantry and the artillery, demand that they be provided with common combat regulations; they maintain, in effect, that on the battle field there is not a tactics of infantry, a tactics of artillery, etc...., but rather a combat tactics common to all arms and which each of them must know. Nothing could be more true; and, in our opinion, such should be the conception of the new service in campaign or of the instruction for the employment of small units (1). But that in no way prevents each arm from having its own manuel containing all the detailed prescriptions relative to the application of the common regulation as regards the particularities of that arm, and regulating questions of instruction.

Furthermore, we have taken several occasions to note the danger of broadcasting to the troops certain ideas, which, although being perfectly correct, are of a nature to lower their confidence and consequently their morale, such as, for example, the idea that the infantry is generally incapable of pushing an attack without the assistance of a powerful mass of artillery. This idea, no matter how correct it may be, particularly when it is a question of attacking an organized position, is of particular interest to the authority which has the responsibility of putting on the operation.

It is particularly the business of the commander to appreciate the importance and the extent of the means of all kinds which he requires to accomplish adequately any enterprise with which he is charged, and particularly the indispensable amount of artillery in order to assure the success of the infantry; for this appreciation, which, furthermore, varies with each particular case, he is solely responsible. It, therefore, does not devolve upon the infantry to judge whether the artillery provided for its support is sufficient or not; as far as it is concerned, every attack which is ordered must be executed with its utmost energy and with an unshakeable confidence in the means of action at its own disposition. It is for this reason that it does not seem to be of any use to have this notion appear in regulations intended for the use of the troops; it is sufficient to insert them in the instruction on the conduct of large units, in calling the attention of the command to their importance and in charging the commander with the insurance of their application.

There is still another question which must be defined; that is, the demarkation between large and small units; we are in a quandary whether to class the division in the former or the latter. For, we have said that the division is the smallest of the large units which is capable of battle under the direct orders of its leader; but it is also the largest of the small units which organically includes the different arms. It is therefore natural to select the division as the type organization to be used in the regulations which should define the combat tactics common to all arms, that is to say, in the decree on service of the armies in campaign. Thus the infantry division will be classed with the small units, as well as the cavalry division; and only the large groups will be included under the term large units.

This is not all; to meet the necessities of modern war, the different regulations which we have described should also:

a. Contain two distinct parts, one relating to open warfare, the other relating to position warfare (2);

(1) In addition it would be better to transfer from the Service in Campaign everything which refers to the organization and the composition of armies in campaign to the Instruction on the conduct of large units.

(2) This would not preclude the retention of Special Regulations on Siege Warfare, which is only a special case of position warfare.

b. In each of these parts, devote more space than formerly to the defensive;

c. Direct thought to the importance of the moral forces and the necessity for their constant development.

With reference to this last opinion, it would be desirable not to be satisfied with acknowledging the overpowering influence of the moral forces as a foreword to the new regulations, and then never mention them again in connection with the numerous questions which are discussed in the regulations; on the contrary, as each question is discussed, the important and often preponderant part of these forces should be brought out in connection with the question under discussion. The different echelons of command will thus be better able to realize that the moral forces, like every other kind of force, must be cultivated, nourished, trained, exercised and sustained lest they become atrophied and desert the ranks of the troops; and they will thus realize the primary role that they must play in this respect. This role, furthermore, is one that is present at all times, in peace as well as in war; in order to fulfill it, leaders are required who are real leaders of men, "who know the soldier and who know how to use him", as Ardant du Procq says. For, this can be learned, and should be taught to all grades, who can only obtain the confidence and the devotion of their troops by example, the dignity of their conduct, care of their dress, love of discipline, respect for order, affection for the soldier, the interest which they have in him both on and off duty, etc....

On its side, the high command will cultivate the morale of the troops, not only by visits made as frequently as possible, but also by its orders and proclamations, never covering up the difficulties to be overcome, but also disclosing every chance in favor of success. He should be very careful to see that the intelligence and information circulated by the second sections of the staffs exactly express the truth, otherwise they will do more harm than good and will soon be looked upon as so much "bunk" (1).

All these measures, however, would remain ineffective, if the Government, particularly in time of war, were not convinced of the necessity for directing public opinion at the rear. In fact, attacks against the morale of armies comes from the rear; we had the demonstration of this in France after 16 April, 1917, as in Germany after the check of the great spring offensives of 1918. The morale of the combatant, which had been well sustained by his leaders, was never seriously shaken by lack of military successes, while it was shown to be very sensitive to suggestions which came from the rear; and, particularly in a long war, it is impossible to suppress the contacts between the armies and the rear. It is therefore at the rear where governmental action should be exercised in opposition to all defeatist propaganda and to maintaining an unshakeable confidence in success in the civil population.

Lastly, it is desirable to introduce into the instruction on the conduct of large units some prescriptions on the method of command. It is not at all a question of rigidly establishing strict rules, to which the command would have to conform under every circumstance. The recommendation which was made and reiterated in our war regulations and according to which "there is no formula which relieves leaders from the necessity of reflection and of conducting the battle", must be maintained. Furthermore, in this as in everything, the regulations provide for only general theory, and the command always remains responsible, in practice, for their adaptation to the requirements of each particular case. Nevertheless, so many different methods were employed during the war, that it seems appropriate to direct the attention of all to the most rational method to be followed. Much useful advice is scattered in the Instruction on the Conduct of Large Units, in the Decree publishing Regulations for Services of the Armies in Campaign, in the Regulations for Maneuver, and in the Instruction on the Service of Staffs; it will do to unite them and to supplement them so as to accentuate the following general ideas:

(1) "Deurrage de crane."

a. The commander makes known his intentions and his will by means of directives, instructions, orders or plans depending upon the position in the hierarchy which he occupies and upon the particular circumstances of the struggle.

b. This will of the commander is a result of the decision which he has arrived at; to make decisions is his principal function; the decision should be based:

- on the end to be accomplished or the mission to be fulfilled;
- on what is known of the situation and the intentions of the enemy;
- on the facilities or the difficulties offered by the terrain to the accomplishment of his purpose;
- on the available means as compared with those which the enemy is presumed to possess;

c. The higher echelon occupied by the commander, the more simple should be his conception of the maneuver to be executed; the nearer we approach the executant, the more complicated does execution become because of terrain, atmospheric conditions, and incidental local conditions.

d. The commander announces the tasks assigned to the subordinate commands, by designating missions to be accomplished and not the means to be employed, the choice of which is always left to the subordinate.

In this connection it must be admitted that our temperament too often induces to designating the means to be employed rather than the object to be accomplished, the mission to be fulfilled. We must school ourselves in ability to translate our will into a mission which leaves to the subordinate the choice of the means of execution. During the period of stabilization, the command was led, either because of the lack of instruction of the troops or because of the short time available, to lay down in its plans many of the details which were not within its province, thus interfering with the attributes of its subordinates and not leaving to them their rightful share of initiative. This is not an example to be followed; and, although the subordinate's initiative naturally becomes reduced in position warfare, it is no less necessary. In any case it is absolutely essential in open warfare, where the fluctuations of battle all the more escape the attention of the command as the latter becomes more distant from the battle field.

e. Depending upon the time available before an operation is begun, it is appropriate to formulate plans or orders which shall be as complete as possible, or, on the contrary, to group the questions in accordance with their urgency and according to the needs of the troops. If this time be greatly reduced, the executants must be given such information, as early as possible, as will allow them either to begin the movement (waring order) or to make adequate preparation for the projected operation.

Based upon these few general ideas, the method of command should protect the leader from the most common errors and should insure:

- that he has adapted the end to be attained to the means available and that his conception is really capable of execution;
- that to express his will, he has made use of the form which is most suitable to the situation (plans, orders, etc...)
- that he has respected the initiative of his subordinates;
- lastly, that he has given adequate consideration to the information of the enemy.

This last consideration, sometimes neglected, deserves some discussion. Experience has demonstrated that the commander should establish his combat procedure (attack or defense) in accordance with what he knows of the enemy's intentions, his armament, his material and moral situation; and should not hesitate to modify this procedure to meet those adopted by the enemy in his defense or attack. The war was not fought in Macedonia or in Palestine in the same way as it was fought on the French front; and on the latter front attacks in 1918 were made in a way which would never have been even considered in 1916 or in 1917. As a result, the methods and procedure of combat must be varied so as to be adapted to the situation and also so as to increase the effect of surprise. Once the Germans noted the effectiveness of a method, they were accustomed to repeat it until it no longer succeeded, instead of changing it before the enemy had found the method of blocking it; whence the failure of their defensive methods in 1917 (divisions of intervention) and in 1918 (outpost zone), as well as of their attack procedure in the spring of 1918 which culminated in the defeat of 15 July.

Thus accurate information of the enemy appears to be necessary (1); this is the role of the second sections. The commander should, in fact, not only orient their efforts by a plan for the collection of intelligence, but he should also consult them frequently and should give the most careful consideration to the indications which they may furnish; working in close liaison with the third section, their efforts must be directed in the same direction as the latter.

But, it must be said, for quite a long period in the war, the command scarcely took into consideration what it was furnished by its second section; and that the latter, lacking any direction as well as the necessary means for investigation, were unable to furnish intelligence of any use in time to be of use. Furthermore, the exaggerated rumors which the second sections spread from the beginning of 1915 as to the degree of exhaustion of Germany resulted in their being discredited.

However, the second sections by slow degrees, put new sources of information into operation, and were soon in condition to fulfill their role; but too often the command neglected to consult them, or rather did not give sufficient weight to the result of their investigations. In addition, our attacks were put in position too long a time ahead, as if the enemy, paralyzed by passivity, could do nothing but receive our blows.

Such errors can no longer be countenanced; and the command must, as it later did, make use of its second section and must give adequate consideration to its work. Every time the command must make a decision, the factor "enemy" must be considered of equal importance to all the others, otherwise errors most prejudicial to success will be made.

In conclusion, on the question of method of command, we must say a few words on the use of the liaison officer between the superior echelon and the subordinate echelon. This method of liaison and information is capable of producing the best results, always provided that those who function in this position are given very definite missions. The liaison officer's normal duties are delicate enough, and he should never under any circumstance be used as an inspector or investigator; he is not qualified for such activity. Aside from his liaison duty, he may be charged with the collection of certain information, with the verification of some detail, to investigate a definite fact, and then he must always report to the authority interested in order to fulfill his mission; but he must never be authorized to give any estimate

(1) This accurate information of the enemy was wanting to us in 1914 and in 1915; Falkenhayn did not have it for his Verdun offensive; it did not stop the 16 April, 1917 offensive, on the Aisne; and finally it should have made us, on 11 November, 1918, refuse the Germans' armistice proposals.

whatever as to the attitude or the ability of leaders to whom he is attached. A single word, a reflection made by him, can, in fact, exert a great influence upon the mind of his own chief and can, wilfully or not, compromise the person who is the object of such comment; for example, the use of the qualification "optimist or pessimist", which was used and abused during the war, and which alone was enough to make or discredit a general officer in the eyes of superior authority. For, men of the pessimists of that period were wrong only in that they saw the situation in a really practical way, asked for the means which they believed to be necessary to accomplish the mission which had been given them and did not let themselves be blinded by vain hopes. They had their jobs to fill, and nobody but their superiors in the chain of command were qualified to appreciate their conduct.

5th. Conclusion.

In concluding this study, we can say that the experience of the last war has not sensibly modified our doctrine; it has allowed it to be rounded out and has abruptly disposed of certain deceptive theories, such as that of the inviolability of fronts, the superiority of the defensive over the offensive, etc.... Thus the following points have been brought into prominence; they must never again be lost sight of;

1st. The adoption of more and more perfected weapons has made battle extremely deadly, particularly in position warfare;

2d. The power of this armament, and particularly that of the artillery, allows destruction to be undertaken which it would have been impossible to even imagine.

3d. The powers of means of investigation (observation and aerial photography), from which it is difficult to hide our enterprises, allows every objective which is not adequately dissimulated, to be precisely located and struck.

4th. As a result of these three new premises, the utilization and the organization of the ground, supplemented by the use of camouflage, become of prime importance as means of escaping destruction.

On the other hand, they force us to take minute precautions which may be interpreted as:

a. for the command and staffs, by detailed foresight, which must be extended as far as possible, into the preparation as well as into the execution of an operation;

b. for the executant, by measures of order and of prudence, which have now become indispensable.

c. for all leaders, by the obligation of maintaining close liaison, not only with neighboring units, but also with the different arms taking part in the action.

5th. The dispositions to be made as a consequence give the battle a more and more methodical form, in which the combination of the different arms must be carefully insured in order to make use of the special properties of each of them to the advantage of the whole and to guard the infantry from the dangers of isolation.

6th. But the effect of this necessity of method is:

-- to complicate infantry combat;

-- to slow up the general progress of operations;

-- to require much more highly developed instruction of troops than formerly;

7th. The increasing dangers to which the combatant is exposed demand an ever increasing moral character.

It may be granted that methodical and scientific procedure may be realized easily enough in the case of an offensive against fortified positions; but once the attack gets out into the open, the situation changes and approaches that of open warfare. Then the share of initiative of which the executants have been temporarily deprived, must be returned to them.

This is even truer in the defensive, in spite of all the foresight which we may exercise, we must expect surprises; the attacker, in effect, attempts to push through into the open terrain in order to force the defender to fight under conditions which he has not foreseen; and then, more than ever, we must rely upon the initiative of subaltern leaders to maintain the situation. The Instruction of 20 December, 1917, said: "Every initiative must be brought into play to meet the multiple incidents of battle."

We must therefore develop the spirit of initiative in every grade, since experience has shown this spirit to be necessary in every situation and that it is exercised with greater difficulty in the defensive than in the offensive; and we must realize the truth that the most judicious pre-arrangements are of no value unless they be executed with discernment which is based upon the actual situation.

We must likewise develop the spirit of method, which the conduct of modern battle demand, but we must be on our guard against any exaggeration at the expense of rapidity. Regard for order and method does not preclude, in every offensive or defensive act, speed of execution, without which exploitation of surprise or the reestablishment of the situation becomes impossible. This the importance of instruction, not only of officers and non-commissioned officers, but also of the troops becomes apparent, for troops only execute rapidly what they know well. De Brack wrote: "In fact in the matter of instruction, when it comes time to apply it, we cannot have too much instruction. On that eventful day it will be too late to learn and it will be time to select what we need and to forget the useless. Furthermore, war has become so complicated and presents so many unexpected opportunities that the reserve of instruction which we have acquired may also find its unexpected application; and if we find an opportunity to apply it, even a single time in the course of our life, it will pay for a year's effort."

Lastly, we must avoid going from one excess to another, which is a tendency of our temperament. In 1870, everything gave way to the defensive, based upon the power of the new armament which we were assured favored the defender rather than the attacker. We therefore believed in the efficacy of good positions and we neglected maneuver; whence the passive character of our operations.

In 1914, on the contrary, everything gave way to the offensive, and the offensive to the bitter end; we primarily sought movement and maneuver; we despised the defensive and with it the material and moral power of fire. During the war itself we have pointed out:

-- the tendency towards the theory of the inviolability of fronts, which followed the theory of the break-through;

-- blind faith in the brutal offensive, delivered first in a head-strong manner, then in successive attacks, and in offensives with limited objectives,

-- efforts to secure rapidity at the expense of order, then attempts at the opposite effect;

-- absolute confidence in the offensive capacity of infantry, then followed by practically the same confidence in the action of the artillery alone;

-- the employment of field warfare methods in the attack of fortified positions, then the employment of position warfare methods when we again get into open warfare, etc....

These errors resulted from the excesses into which we fell and which must be guarded against in the future. "In medio stat virtus"; is as true in military affairs as in any others.

From all the foregoing we will retain first of all the guiding idea which dominates the conception as well as the execution of every operation; deploy all energy to destroy and to be not destroyed. All the rules of battle are direct consequences of that primordial idea. It is this idea which inspires the assembly and the accumulation of means, which demands economy of force, which leads us to provide for surprise, and which, at certain times, counsels the boldest stroke as being the best means of obtaining important results with the minimum of losses.

This is not all; in order to win in addition we must have leaders who are well chosen and energetic, animated with ardent faith in success and who are unshakable in their resolution.

We must have troops, perfectly instructed, armed and trained, troops who have the resolution to make the adversary suffer and who do not fear suffering for themselves.

Lastly we must have staffs, who are conscientious, experienced, optimistic, permeated with the spirit of duty and sacrifice, resolved to share, at the same time, both the responsibility of the leader and the dangers of the troops.

It is only at this price that victory is obtained.
